TURNING ON MOBILE LEARNING
IN LATIN AMERICA

> Illustrative Initiatives
and Policy Implications

ABOUT THE SERIES

This paper is part of the UNESCO Working Paper Series on Mobile Learning. The Series seeks to better understand how mobile technologies can be used to improve educational access, equity and quality around the world. It comprises fourteen individual papers that will be published throughout 2012.

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Latin America currently faces extensive challenges in education. The most salient issues include high drop-out rates, especially in secondary education; adult illiteracy; limited access to education, particularly initial and pre-school education; low educational quality; and insufficient teacher training programmes. These problems are especially pronounced in low-income urban and rural populations as well as in indigenous communities. Recently, education stakeholders in both the public and private sectors have begun to explore mobile learning as a possible strategy for addressing some of the region's most pressing educational needs.

While the use of mobile phones is growing rapidly in Latin America, mobile learning initiatives are still in the early stages of development. Most programmes are pilot projects, driven by non-profit organizations or universities, that typically target small groups and focus on particular and often local needs. This review examined seventeen initiatives and found that they typically fit into one of five profiles: experimental programmes launched at the university level; pilot programmes for children and adolescents in vulnerable populations; literacy programmes for youth and adults; programmes seeking to improve educational management; and programmes addressing specific issues such as assessment and test preparation, especially preparation for university entrance examinations.

At the policy level, mobile learning is still in its infancy. Restrictions on the use of mobile phones in schools are still widely imposed through government or institutional rules, though this situation is changing in some countries. At present, there is a substantial effort under way in many countries to implement 1:1 (one laptop per student) programmes. While this means that information and communications technology (ICT) policies have a strong presence on the educational agenda, the focus tends to be on computer-based programmes, and initiatives related to mobile devices are rare. The high cost of internet connectivity also poses a barrier to mobile learning. Despite the fact that mobile phone use has grown enormously in the last decade, and that the number of internet users continues to grow steadily, the region's telecommunications infrastructure is extremely limited. Broadband access, both fixed and mobile, is still scarce and expensive for large segments of the population.

Nevertheless, mobile learning holds considerable potential in the region. In particular, educators and policy-makers have shown interest in exploring how mobile technologies can be used to address key educational issues such as literacy, educational access and retention. Additionally, mobile technologies may be able to aid school administrators and improve the management of education systems in the region. Moving forward, mobile learning policies will need to build on current ICT programmes and online educational resources, account for the potentially expensive maintenance and repair costs, support teacher training and development, and align with the region's broader goals of achieving educational justice and quality.

Latin America is a heterogeneous region in which most countries have historically experienced very high levels of poverty and social inequality. Politically unstable until the early 1980s, the region is now characterized by strengthening democracies and slow yet relatively steady economic growth (SITEAL, 2006). In spite of the improving economy, however, poverty levels have changed little in the last decade, while social inequality has in fact increased. Mobile learning – learning using mobile technologies – has the potential to ameliorate some of the social inequalities apparent in the region's education systems, by increasing students' and teachers' access to educational materials and programmes and possibly improving the quality of teaching and learning as well. While mobile learning is not widespread in Latin America, the proliferation of mobile phones in the region represents a significant opportunity to leverage mobile technologies for educational purposes. Mobile learning is especially promising in its potential to reach the region's marginalized populations, including people living in rural areas and indigenous communities.

The objective of this paper is to survey the policies and initiatives related to the educational use of mobile phones in Latin America. Mobile learning is an emerging concept in the region: though a small number of programmes have been launched, mobile learning has little presence on the educational agenda for most countries, and educators are by no means convinced of its benefits. Thus the purpose of this review is to provide an overview of mobile learning in the region that can form the basis of discussion and decision-making. For this reason, the paper focuses on macro-level issues, seeking to highlight those initiatives that might contribute most to the design and implementation of policies.

The initiatives identified in this paper involve the use of mobile phones only. Although mobile learning may incorporate other mobile technologies, such as tablet computers, these devices were excluded from this review because of their higher cost and limited availability in the region. Also, since the paper focuses on policy, it is not limited solely to teaching and learning in the strictest sense, but rather describes initiatives related to all aspects of the education system, including administration and management.

Research for this review surveyed initiatives and policies in thirty-four countries in Latin America and the Caribbean. For a list of the countries surveyed, see Appendix A. Because no mobile learning initiatives were identified in the Caribbean, this paper focuses solely on Latin America.

This paper aims to provide an overview of the context for mobile learning in Latin America, including the most pressing educational issues, the existing technological infrastructure and the current level of ICT integration in education. It describes the main mobile learning initiatives in the region and identifies local, national and regional policies that affect mobile learning. The paper also discusses the factors influencing mobile learning in the region, predicts scenarios for mobile learning that are likely to develop in the near future, and provides recommendations for policy-makers and education leaders interested in developing or expanding mobile learning opportunities in Latin America.

DATA COLLECTION

The data presented in this paper were collected between September and November 2011, from primary and secondary sources. Three different methods were used to gather information: personal interviews, a review of relevant literature and online resources, and an email questionnaire.

First, interviews were conducted with regional experts in ICT and education, through face-to-face meetings, telephone conversations and email exchanges. Interview questions focused on identifying existing mobile learning policies and initiatives and characterizing the main factors that affect mobile learning efforts in the region. The coordinators of identified initiatives were also interviewed to expand on available information about their programmes. For a list of interviewees, see Appendix B. The interview guide is presented in Appendix C, though this represents only a starting point for the interviews and does not necessarily include all of the questions asked.

Second, information on current mobile learning initiatives was gathered through a review of the relevant literature on mobile learning in the region, including educational journal articles and other publications, and a perusal of online resources, including websites for mobile learning programmes and Ministry of Education websites for various countries.

Third, a questionnaire was sent via email to representatives of the Ministries of Education or equivalent organizations in all thirty-four countries in the region. The questions were similar to those asked during the interviews with regional experts, with greater emphasis on existing policies and the presence of mobile learning in the national education agenda. The questionnaire covered four main topics:

- The existence of supportive or restrictive policies on the use of mobile phones in educational settings

- The level of registered mobile phone use at each educational level

- The primary stakeholders involved in encouraging or restricting the use of mobile phones in education

- The perceived drivers, enablers, barriers and success factors for mobile learning in the region

For a copy of the questionnaire, see Appendix D.

Of the thirty-four questionnaires sent, only six were returned. No surveys were returned from the Caribbean. In Latin America, representatives from Chile, Colombia, Guatemala, Mexico, Nicaragua and Uruguay completed the questionnaire. In the cases of Chile and Uruguay, the

answers were provided by representatives of the governments' ICT in education programmes (Enlaces and Plan Ceibal, respectively), while the remainder were completed by technical staff or direct advisors to the country's Minister of Education. In the case of Mexico, the returned information was incomplete.

INITIATIVE SELECTION

Not every initiative identified through the research was included in this paper. A two-step selection process was used to choose initiatives relevant to the scope and purpose of this review. To begin with, the initial research described above – namely interviews, a literature review and online research – was used to identify initiatives that a) were developed in the last five years and b) could be replicated on an institutional level. Small-scale projects implemented by individuals or groups outside of schools or educational organizations were not included. These criteria resulted in the identification seventeen initiatives. A list of all of these initiatives and their main characteristics is included in Appendix E.

A preliminary analysis of these initiatives revealed that many were limited to individual institutions, lacked support and recognition from educational governing bodies, or failed to address the main educational issues in the region. This led to a second selection process based on three additional criteria:

1. **Scope:** The scope of the initiative should extend beyond a single school. Because most universities in the region operate autonomously, the focus was limited to primary and secondary education.

2. **Support:** The initiative must in some way be supported or recognized by an organization responsible for managing education systems, such as the national Ministry of Education or a local school-governing body.

3. **Relevance:** The initiative must be connected to current educational issues and should aim to ameliorate one or more of the region's educational problems.

These criteria resulted in a list of seven mobile learning initiatives relevant to education policy in the region. Each of these programmes are described in depth in the section of this paper devoted to mobile learning initiatives.

CONTEXT FOR MOBILE LEARNING

Before considering the various mobile learning policies and initiatives in the region, it is important to understand the context for mobile learning in Latin America. The following sections describe the region's most salient educational issues, which mobile learning programmes should seek to address; the telecommunications challenges that might inhibit mobile learning; and the current policies on the use of ICT in education, which may help pave the way for mobile learning programmes.

EDUCATIONAL ISSUES

Education has been a major target of development efforts in the region since the middle of the twentieth century. Most of these efforts have focused on increasing access to primary and secondary education. As a result, both primary and secondary schooling expanded considerably from the 1950s to the present (SITEAL, 2006). In the last decade, the region's average enrolment percentage for primary-school-aged children rose from 93% to 95%, and many countries have achieved universal primary education (UNESCO, 2011). During this same time period, regional enrolment in secondary education increased from 81% to 90%.

Nonetheless, the region continues to face significant educational challenges, including high drop-out rates and adult illiteracy. Like most problems afflicting Latin American society, educational issues are substantially more pronounced for socio-economically disadvantaged and marginalized groups, including women, lower-income groups, rural populations and indigenous peoples. Reform efforts, including mobile learning policies and initiatives, should specifically target these populations. The following sections describe the most pressing educational issues in Latin America in terms of how they affect the region's various social and socio-economic groups.

GRADUATION RATES

The United Nations Economic Commission for Latin America and the Caribbean (ECLAC) reported that while in higher-income groups only 2% of children have not completed primary education, in lower-income groups this figure rises to 12%. Moreover, the graduation rate at the primary level is 96% in urban areas and only 85% in rural areas, with primary-school drop-out rates particularly high among indigenous and Afro-American populations (ECLAC, 2010*b*). These disparities are intensified at the secondary education level. Four out of five young people living in high-income households complete secondary school, compared with only one in five from low-income households.

While graduation rates from primary and secondary school vary widely throughout the region, countries can be grouped into five broad categories (SITEAL, 2010). See Figure 1 for a visual representation.

1. ***Group 1: High graduation rates at both the primary and secondary levels***
Countries: Argentina, Chile, Cuba and Peru

   In these countries, most of the population between 5 and 17 years of age has access to primary and secondary education, and most succeed in completing both primary and secondary school. Drop-out rates are linked to socio-economic status and geographic location, increasing considerably for students in lower socio-economic groups and in rural areas.

2. ***Group 2: High graduation rates at the primary level and medium graduation rates at the secondary level***
Countries: Bolivia, Brazil, Colombia, Costa Rica, Ecuador, Mexico and Panama

   The distribution of educational problems is more uneven for these countries. For every adolescent with high socio-economic status who drops out of secondary school, there are four students from low socio-economic groups who do the same. Similarly, for each city-dwelling adolescent no longer attending school at age 17, there are two in rural areas who find themselves in the same situation.

3. ***Group 3: High graduation rates at the primary level and low graduation rates at the secondary level***
Countries: Paraguay and Uruguay

   Students in these countries tend to be low-performing, have difficulty progressing from primary school to secondary school, and struggle to retain information learned in secondary school. Achievement gaps between students from different socio-economic groups tend to be more pronounced than in other countries in the region.

4. ***Group 4: Medium graduation rates at both the primary and secondary levels***
Countries: Dominican Republic and El Salvador

   These countries have widespread access to primary education. However, a significantly high proportion of students repeat grades and remain in primary school beyond the normal age for graduation. In some cases primary schooling extends up to the age of 17. Disparities in academic performance among different socio-economic groups and geographic areas are very conspicuous. While underperformance crosses all levels of society, it is almost negligible in the upper income groups and quite marked in the lower.

5. ***Group 5: Medium graduation rates at the primary level and low graduation rates at the secondary level***
Countries: Honduras, Guatemala and Nicaragua

   These countries provide significantly less access to education than others in the region. Maximum education attendance occurs at age 9, implying late access to schooling. The percentage of children and adolescents who never attend school is far higher than in other countries in the region. Inequality based on socio-economic status and geographic location is extreme. In low socio-economic groups and rural populations, many children have no access to education, while in the highest socio-economic groups, some adolescents' educational achievement is almost on par with students in the region's more developed countries.

Figure 1. 2008 graduation rates in primary education (vertical axis) and secondary education (horizontal axis) for eighteen Latin American countries
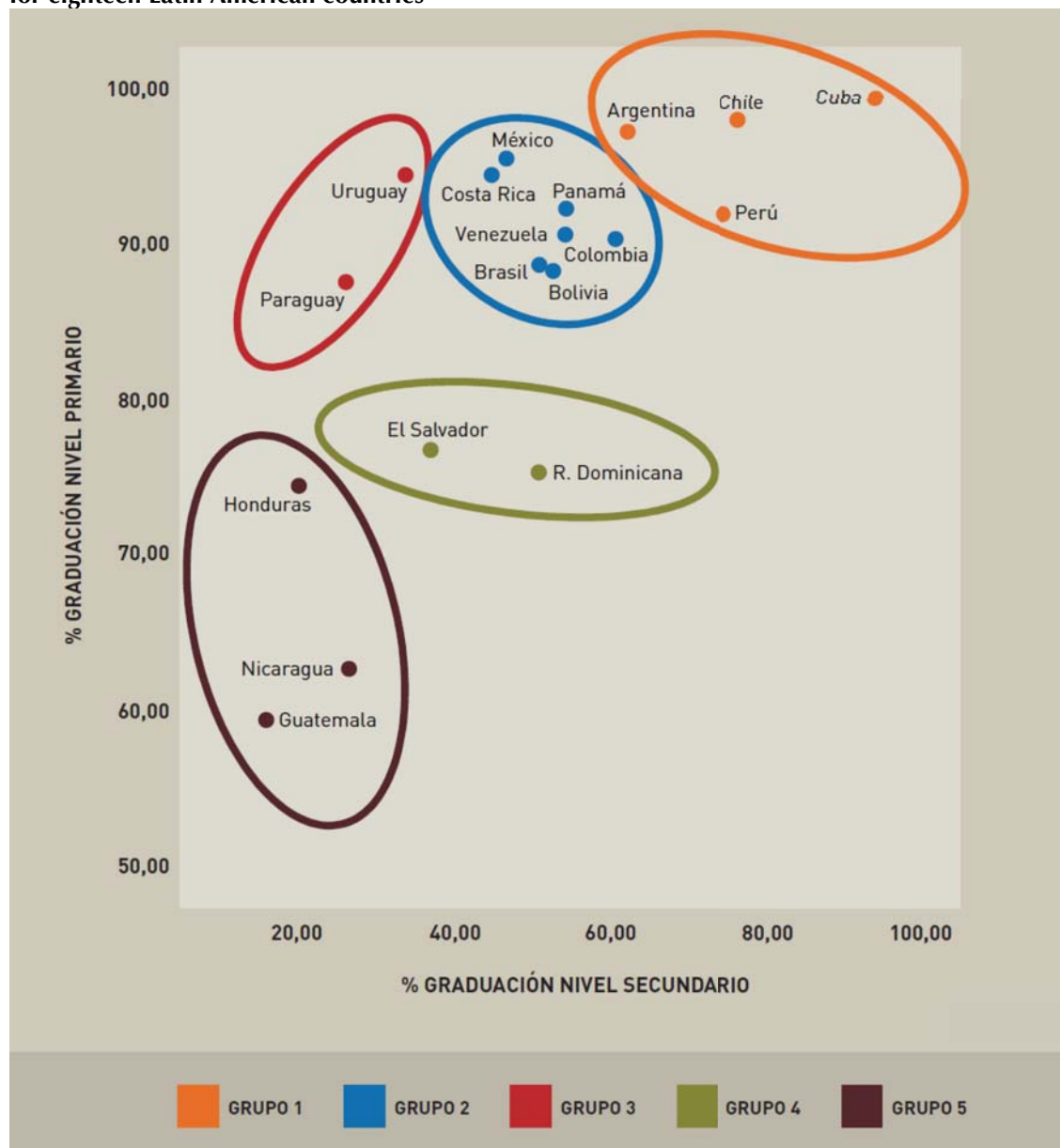
Source: SITEAL, 2010

Throughout Latin America, drop-out rates and grade repetition correlate closely to socio-economic status, geographic location and gender. In other words, the most vulnerable members of society – poor people, people living in rural areas, and women – are the most likely to discontinue their education (SITEAL, 2010).

LITERACY

Literacy rates in Latin America are indicative of the inequalities between and within countries. Although the region's average illiteracy rate is no higher than 9% of the population aged 15 and over, in several countries – including Ecuador, El Salvador, Guatemala, Honduras and Nicaragua – it exceeds 15%, while in others – Argentina, Chile, Costa Rica, Cuba, Venezuela and Uruguay – it is less than 5%. Throughout the region, women are more likely to be illiterate than men.

Functional illiteracy – the inability to use basic reading, writing and numeracy skills efficiently in everyday life – is more widespread, affecting almost 29% of people aged 15 and older in the region. Disparities between different socio-economic groups are remarkable, ranging from almost 47% in the lowest-income quintile to around 13% in the wealthiest one (OEI/ECLAC/SEGIB, 2010). Eradicating both illiteracy and functional illiteracy is one of the most important educational challenges faced by countries in the region today.

ACCESS TO EDUCATION

While significant progress has been made to increase students' access to primary and secondary education in Latin America, access to pre-primary and higher education is still quite limited in many parts of the region. Between 1975 and 2005, access to higher education in the region multiplied by four, reaching up to 16 million students. However, the average enrolment rate is still far below that of more developed countries. While the gross entry rate for higher education for developed countries has ranged from 50% to 88% in recent years, in Latin America it is estimated to be 32% (UNESCO/IESALC, 2009).

A growing body of evidence points to the importance of early education in a child's development (Heckman, 2008). Broadening the coverage of early and pre-primary education, especially for disadvantaged children, is a key priority for education policy-makers. Some countries, such as Cuba and Mexico, have almost universal access, while others, including Guatemala, Honduras, Paraguay and the Dominican Republic, report pre-school education access levels as low as 30%. Education for children younger than 3 years of age is likely to be significantly lower, due to smaller institutional coverage and a variety of cultural factors (OEI/ECLAC/SEGIB, 2010). Though little data is available on early and pre-primary education in the region, it is known that access to educational services and child care is more common in higher-income socio-economic groups, especially for younger children.

EDUCATION QUALITY

Student performance is an important measure of the quality of a country's education system. According to UNESCO's Second Regional Comparative and Explanatory Study (SERCE) for Latin America, which focused on language and mathematics performance for students in Grade 3 and language, mathematics and science performance for students in Grade 6, high percentages of students in the region are markedly deficient in basic skills, especially when compared to students in more developed countries (UNESCO, 2005). The Programme for International Student Assessment (PISA) – a system of international assessments focusing on 15-year-olds' reading, mathematics and science skills – reported similar findings. The 2009 PISA results revealed that even though some countries in Latin America had improved their performance since the 2006 PISA, none of them reached adequate levels as determined by the Organisation for Economic Co-operation and Development (OECD), the international organization that manages PISA (Ganimian and Solano Rocha, 2011). In order to increase student performance and enhance the quality of education in Latin America, improvement is needed in several key areas, including administrative management, assessment and teacher education.

TEACHER QUALITY

Because teacher quality is a key factor in student success, strategies to improve students' academic performance and learning experiences must emphasize education and professional development for teachers. Comparative research has revealed that the countries with the best results in international assessments and evaluations are those that prioritize teachers: they select candidates for teacher education programmes from among the upper third of graduates from secondary education, offer good initial salaries to make teaching an attractive profession, and provide multiple opportunities for career development (Barber and Mourshed, 2007; Ingersoll, 2007).

Though there is little substantive data on teaching in the region, a few key studies conducted in the last decade provide a snapshot of the teaching profession in Latin America (Vaillant, 2004; Tenti Fanfani, 2006):

- Teacher education is often highly theoretical, with few opportunities for classroom practice and little emphasis on content knowledge. Very little attention is given to pedagogical techniques aimed at meeting the needs of disadvantaged students.

- Teaching is widely regarded as a profession that 'does not pay enough', with initial salaries and salary increase structures that are significantly lower than other careers. Substantial salary increases are only offered when a teacher is promoted to an administrative position, such as principal or school system supervisor. Consequently, high-quality teachers often abandon the profession.

- Teachers in the region tend to receive less formal education than teachers in more developed countries, with an average of twelve years in Latin America, versus sixteen years in more developed countries. Teachers are predominantly female and younger than teachers in developed countries.

- Teacher evaluation is almost non-existent. Teachers are promoted according to seniority rather than performance. The most coveted positions are higher-paid administrative roles with management responsibilities, rather than upper-level teaching positions.

- Teaching in disadvantaged schools is not incentivized. There are no programmes to motivate teachers with more experience and training to work in the areas where they are needed most.

- Teachers and students are equally affected by poverty, with more and more teachers coming from the lowest income quintile.

MULTICULTURAL EDUCATION

Between 40 and 50 million indigenous people and more than 150 million people of African descent live in Latin America and the Caribbean. They have endured a history of annihilation, exploitation, neglect and discrimination, which today places them at a disadvantage in terms of social, political, economic and cultural integration. Statistics consistently show that these

peoples are conspicuously represented in the region's poorer or more marginalized sectors of society. They hold the most precarious jobs in the labour market, their presence at the decision-making levels of government and business is scant, and their access to quality education is still extremely limited.

According to data from the United Nations Population Fund, there are between 400 and 640 such communities recognized by the different states of the region, with members who speak as many or more languages and dialects. The highest concentrations are found mostly in Mexico, Bolivia and Guatemala, followed by Peru, Ecuador, Colombia, Brazil, Chile and some additional countries in Central America and the Caribbean (Itzcovich, 2011).

In spite of this cultural diversity, multicultural or intercultural bilingual education is not widespread. Attempts to develop multicultural education policies and programmes have mostly failed due to issues such as low funding, poor teacher training, lack of bilingual teachers, and insufficient resources. Exploring new alternatives and approaches to multicultural education should be a top priority for the region's education leaders.

TELECOMMUNICATIONS CHALLENGES

In order to assess the feasibility and potential efficacy of mobile learning programmes in Latin America, it is important to examine the current telecommunications infrastructure in terms of its ability to support mobile technologies. The use of mobile phones has grown exponentially over the past ten years, with mobile phone subscribers representing 99% of the population and surpassing 100% in several countries. This does not mean coverage is universal, as some people may own multiple mobile phones while others have none. Nevertheless, mobile phone use is extremely high for all socio-economic groups in the region.

While the ubiquity of mobile phones represents a significant opportunity for mobile learning, deficits in other technologies may limit its potential reach. First of all, the majority of mobile phones in the region use second-generation technologies (2G). Although no comprehensive statistics on this topic are available for the region at the moment, it is clear that third-generation (3G) and fourth-generation (4G) technologies are being used on a much smaller scale. This may limit students' and teachers' access to mobile device programs and applications intended for use with 3G and 4G technologies.

More importantly, mobile broadband (or wireless internet) access in the region is extremely low: in 2009 mobile broadband users represented only 4.2% of the population. To put this number in perspective, average mobile broadband use is 47% – more than ten times higher – in OECD member countries, which include developed countries mainly in Europe, North America and Asia (Jordan, 2011). Whereas in OECD countries mobile broadband access is twice as prevalent as fixed broadband access, in Latin America fixed broadband still outweighs mobile broadband, though this situation is expected to change in the near future. One of the reasons for low broadband use is the high cost of connectivity. In many OECD countries, the cost of a fixed broadband connection of one megabit per second (Mbps) represents less than 1% of the average monthly per capita income, whereas in most of Latin American countries this connection can cost between 10% and 100% of the average monthly

income (ECLAC, 2010a). This inverse trend also applies within the region: a comparison of connectivity costs as a percentage of monthly per capita gross domestic product (GDP) for each country in the region reveals that broadband costs are highest in the lowest-income countries. Connectivity costs for mobile broadband are typically even higher than for fixed broadband.

The distribution of technology and technological infrastructure in Latin America mirrors the inequalities in education. Some higher-income countries, such as Argentina, Chile, Puerto Rico, Panama, Trinidad and Tobago, and Uruguay, have more advanced telecommunications infrastructures, while a larger group of lower-income countries – including Belize, Bolivia, Ecuador, Guatemala, Honduras, Nicaragua, Paraguay, Peru and the Dominican Republic – are still in the initial stages of infrastructure development (Katz, 2011). The remaining countries fall somewhere in the middle. Although important progress has been made in the last few years to expand access to technology, the technological gap between the region's upper and lower socio-economic groups – the so-called 'digital divide' – is still significant. Internet access is especially low in rural areas, where infrastructure expansion is not a profitable venture. The region's already low levels of broadband use drop even further outside its capital cities and metropolitan areas, where network coverage falls off sharply (Jordan, 2011). In many cases, the digital revolution is occurring in large cities only.

ICT IN EDUCATION

At present, many countries in Latin America have programmes or initiatives for the integration of ICT into their educational systems. ICT policies aimed at the education sector began in the 1990s, with the launching of four milestone programmes: the Red Enlaces (Links Network) in Chile; Proinfo in Brazil; the Red Escolar (School Network) in Mexico, and the Programa de Informática Educativa (Computer Education Programme) in Costa Rica. These programmes differed from previous ICT initiatives in that they provided connectivity in addition to equipment, opening up new possibilities for technology use in education. Similar initiatives followed, including Argentina's Educ.ar and Conectar Igualdad, Colombia's Colombia Aprende (Colombia Learns), Peru's Huascarán and Uruguay's Plan Ceibal, to name a few.

The last two decades have seen the emergence of three models for ICT incorporation in education, mainly focused on computers and laptops. The first, characteristic of most early educational ICT programmes in Latin America, is the laboratory model. In this model, computers are used in a single, designated room, which teachers must reserve in advance for their classes. In some cases, the teachers' room and the library are also equipped with computers, with the aim of broadening opportunities for independent work for teachers and students. The main benefit of this model is cost-efficiency, as schools save on equipment expenses by only purchasing one classroom set of computers.

A second model emerged out of efforts to align ICT policies with pedagogy and curriculum. In the classroom model, individual classrooms are equipped with computers to make ICT available to students and teachers as a resource for certain educational activities. Since classrooms are usually equipped with only one or two computers, access for individual students is limited. However, this model does expand the possibilities for ICT integration into

the curriculum, particularly for use in group work, as teachers can plan lessons and group projects supported by digital resources.

The third and most recent model is the 1:1 programme, in which each student and teacher has access to a computer, most often a laptop. The first of these programmes was Uruguay's ambitious Plan Ceibal, launched in 2006, which aimed to provide every student and teacher in the country with a laptop. Similar policies have since been adopted by several countries in the region, including Argentina, Brazil, Colombia, Peru and Venezuela (Severín and Capota, 2011; IIEP-UNESCO, 2012). The main drawback to this model is the high cost associated with purchasing a laptop for each student. A less expensive alternative is the mobile laboratory, also called the mobile classroom, in which a school owns several classroom sets of laptops on movable carts, typically enough for twenty-five to thirty students. Like the laboratory model, resources are limited, so teachers need to plan ahead and book the carts for specific lessons. During the lesson, however, students are able to use the computers in a 1:1 environment. This model has been implemented by the Red Enlaces programme in Chile, and in several provinces in Argentina.

In the last three years, the 1:1 model has become increasingly widespread, and 1:1 programmes are now the primary focus of national policies for ICT in education in the region. Policy-makers are no longer discussing whether the 1:1 model is worthy of investment but rather how best to achieve it. As mobile technologies improve and mobile devices such as smartphones are increasingly able to provide the same functionalities as computers, mobile learning may offer a cost-effective solution, allowing schools to achieve a 1:1 learning environment without the expense of purchasing laptops for every student.

MOBILE LEARNING INITIATIVES

Though mobile learning is by no means widespread in Latin America, several countries have recently launched mobile learning initiatives, and small-scale mobile learning programmes can be found throughout the region. The initiatives highlighted in this section were chosen based on their scope, level of organizational support and relevance to educational issues in the region. Each programme described below was designed to impact a large number of people and is supported, directly or indirectly, by the national or local government. The programmes are categorized by the specific educational need they address. For a comprehensive list of mobile learning initiatives in the region, see Appendix E.

RAISING LITERACY RATES: Programa Nacional de Alfabetización (Colombia)

Illiteracy rates vary within and between countries in Latin America and are typically higher in poorer countries and among low-income and rural populations. In Colombia, there are approximately 1.67 million illiterate people aged 15 and older, representing between 6% and 7% of the country's adult population (Redacción Vida de Hoy, 2011; World Bank). In an attempt to ameliorate this situation, Colombia's Ministry of Education, together with the Ministry of ICT and the Organization of Ibero-American States (OEI), has designed the largest mobile learning initiative in Latin America: the Programa Nacional de Alfabetización (National Literacy Programme). Through this programme, the government plans to deliver mobile devices to illiterate youth and adults living in underprivileged areas of the country. The devices will include SIM cards loaded with six modules of interactive and self-directed educational content aimed at increasing users' literacy and basic skills. An internet connection will not be required to access the content, though it might be necessary for assessment or technical support. The government plans to purchase and distribute 250,000 mobile devices and accompanying SIM cards in the first stage of the project, which is expected to be implemented in 2012. The devices and cards will be delivered for free. Because the programme is still in its design phase, the specific devices, delivery strategies and plans for internet connectivity have yet to be determined.

INCREASING ACCESS TO HIGHER EDUCATION: PSU Móvil (Chile)

Chile is among the countries with the highest graduation rates for secondary education in the region, with approximately 80% of all students completing high school (SITEAL, 2010). The country's enrolment rates for postsecondary education, however, show significant gaps among different socio-economic groups. Available data for 2006 indicate that while students in the highest income quintile are only one and a half times more likely to complete their

secondary education than those in the lowest income quintile, they are three times more likely to enrol in a postsecondary institution (OECD/World Bank, 2009). One of the reasons for this disparity is the Prueba de Selección Universitaria (PSU), the national university admissions test that has been administered since 2003. Students from municipal schools, who generally come from low-income households, are less likely to pass this test or obtain the highest scores (OECD/World Bank, 2009; Koljatic and Silva, 2010).

The same year the PSU was implemented, the Ministry of Education and the Fundación Chile (Chile Foundation, FCH), a non-profit technology organization supported by the government, launched Educarchile, a national educational internet portal. Aimed at narrowing the digital divide between students of high and low socio-economic status, the website provides teachers and students with free online access to curriculum support and digital resources, including test preparation tools, and an entire section of the site is devoted to the PSU. Eligible students can log in to PSU Educarchile to take diagnostic tests, study content material and complete practice exercises.

In 2009, as part of an effort to increase PSU pass rates, an application called PSU Móvil (PSU Mobile) was developed to provide access to PSU Educarchile via mobile devices. This free downloadable application gives students access to packs of exercises, games and podcasts, all sorted by topic. It also provides information on university courses of study and career paths, a calendar of important PSU dates and deadlines, and diagnostic results for completed practice exercises. In March 2012, PSU Educarchile also launched PSU test preparation aids for use on social networking sites. Students can now access daily study guides for the PSU via Facebook and Twitter, online or through their mobile devices (FCH, 2012).

While there is little data on the success of the Educarchile project, it is clear that it has tremendous reach. According to the Fundación Chile, the website is the world's largest Spanish-language education portal and the seventh most visited site in Chile, with 4.4 million hits per month (FCH, 2008). The number of visitors to the PSU section of the site has grown steadily since its creation, reaching almost 1 million in 2010. In 2011, twenty PSU Educarchile users were among the students who achieved the country's highest PSU scores (FCH, 2012). While there is currently no information available on the number of PSU Móvil users, it is likely that this application has increased access to the portal's test preparation tools.

IMPROVING EDUCATION MANAGEMENT: Mobiles for Supervisors (Argentina)

The management of schools and education systems forms an important component of educational quality. In Latin America, some of the most pressing educational management concerns include a dearth of information on school performance and a lack of communication between schools and school system supervisors (Casassus, 2000; Aguerrondo, 2002; RedAGE, 2011).

The Argentine province of Mendoza has made significant progress in improving the production and management of educational information. An online system is used to report and track data on students' academic performance and schools' human resources and

infrastructure needs. However, approximately half of the province's 1,634 public schools are located in rural areas, making access to computer equipment and internet connectivity challenging (DiNIECE, 2010; R. Militello, personal communication, 1 November 2011). Educators and administrators in rural schools have difficulty accessing the online system to enter data, and consequently much of the information on these schools is outdated. Additionally, when school system supervisors visit the schools, they cannot access the online system to enter information or consult relevant data that might facilitate the evaluation process.

To address some of these issues, in 2010 the province launched an initiative called Mobiles for Supervisors that provided 350 school system supervisors with smartphones and mobile service plans. The plans include unlimited calls within the same mobile network and up to eight hours of out-of-network calls per month, as well as unlimited 3G internet access. The devices are equipped with applications to access email and open Word, Excel, PowerPoint and PDF files, as well as an application specifically designed for the programme, which allows users to access the province's online school data system. With these mobile devices, school system supervisors visiting rural schools can connect to the online system directly from their smartphones. While this programme does not solve schools' equipment or connectivity issues, it does provide a temporary solution that is efficient, inexpensive and easy to implement. The coordinator of the Information Technology Directorate for Mendoza stated that a provincial plan to deliver equipment and internet connectivity to these schools is currently under way (R. Militello, personal communication, 1 November 2011).

IMPROVING ASSESSMENT: Evaluación de Aprendizajes a través de Celulares (Paraguay)

Many countries around the world use educational assessments – usually in the form of standardized tests – to evaluate student progress on a national level. The first national educational assessment systems in Latin America were implemented in 1988 in Brazil and Chile, with most other countries following suit over the next decade (LLECE, 1997). The scope and efficacy of these systems vary widely throughout the region, depending on the financial and functional capacities of the individual assessment agencies and the political contexts in which they operate. In many cases, the sheer number of steps involved – from designing, printing, distributing and administering the tests to collecting, analysing and reporting the results – poses challenges for countries facing infrastructure and human resource deficits. Some of the main areas in need of development across the region include the alignment of assessments with curricular goals, the allocation of resources for administering the tests and managing the assessment systems, and the dissemination and use of results to improve teaching and learning in schools (Ferrer, 2006).

In 2011, Paraguay's Ministry of Education launched the Evaluación de Aprendizajes a través de Celulares (Learning Assessment through Mobile Phones) pilot project to explore the possibilities of administering standardized tests through students' mobile phones. The assessment, which focused on mathematics and Spanish language and literature, was designed by curriculum specialists to address key content areas in the national curriculum. The project was aimed at students in their first three years of secondary school, in 300 public

schools nationwide, and included training for teachers and school directors to help students prepare to take the test on their mobile phones and to provide technical support on the day of the exam.

Of the 18,000 students targeted, about 10,000 completed the assessment. Students entered a code in their mobile phones to receive multiple-choice questions and sent their replies as text messages. Their responses were uploaded directly to the Ministry of Education's database, which greatly increased the speed with which the results could be processed. Also, because students used their own mobile phones to take the test, the cost and human resource demands of distributing the assessment were substantially reduced. The results of the assessment, as well as an evaluation of the methods used to administer it, are not yet available to the public; they will be part of a future report to be published by the Ministry of Education of Paraguay.

IMPROVING TEACHING AND LEARNING: BrigdeIT and Seeds of Empowerment (multiple countries)

The improvement of teaching and learning is one of the primary goals of mobile learning efforts. Many mobile learning initiatives in Latin America seek to leverage the portability, ubiquity and connectivity afforded by mobile technologies to increase students' and teachers' access to educational opportunities and improve the quality of learning experiences. The three projects identified in this section focus specifically on improving educational quality for socio-economically disadvantaged groups and other vulnerable populations in the region.

The first two projects were launched by BridgeIT, a global initiative led by Nokia, the Pearson Foundation, the United Nations Development Programme (UNDP) and the International Youth Foundation (IYF) that aims to enhance educational quality around the world through the use of mobile devices in the classroom. All BridgeIT projects focus on teacher education and professional development. Teachers participate in workshops where they learn to use a smartphone to access multimedia resources through the Nokia Education Delivery (NED) application. Teachers then use the resources to develop and update curriculum plans for a variety of content areas. Each participating school receives a smartphone along with a planning kit developed by the teachers during training.

For its first project in Latin America, in 2009 BridgeIT partnered with the Asociación Chilena Pro Naciones Unidas (Chilean Association for the United Nations, ACHNU), the Asociación Chilena de Municipalidades (Association of Chilean Municipalities, ACHM) and the telecommunications company Telefónica to design and implement a mobile learning programme in Chile. The programme, called Puentes Educativos (Educational Bridges), is expected to run for three years (2010–2012) and reach 660 teachers and 22,000 students in 210 urban and rural schools throughout the country (Plaza and Carreras, 2010). Students in the targeted schools represent 70% of the country's poorest socio-economic groups. The programme focuses on improving mathematics, science and English language skills for primary-school students in Grades 5 and 6. Participating schools are given access to an extensive library of educational videos developed by the Pearson Foundation that have been translated into Spanish and specifically adapted to the Chilean national curriculum. Internet access to download the videos is subsidized by Telefónica to reduce costs for schools and

local governments. Teachers attend training workshops on incorporating mobile technologies and digital resources into the curriculum, with an emphasis on increasing student engagement and promoting student-centred learning activities. The programme also includes a strong monitoring and support component for schools. Programme coordinators place monthly phone calls to participating teachers to discuss class results and any problems that may arise, and regular phone calls are also made to school directors and local government officials in participating municipalities. In addition, surveys are sent to teachers via text message, and each school is visited twice a year.

Project managers are exploring a variety of options for continuing the Puentes Educativos programme after 2012. Chile's Ministry of Education is considering becoming a partner in the project. Alternatively, participating institutions may assume some of the implementation costs – around 5%, which would equal US$225 for the first year and US$100 per year for subsequent years. While this plan would require schools to raise funds to support the project, the potential benefits include a greater sense of ownership and commitment on the part of the schools, which may in turn lead to long-term sustainability (G. Plaza, personal communication, 16 November 2011).

In 2011, BridgeIT began planning a second project in Latin America: the Raíces de Aprendizaje Móvil (Roots of Mobile Learning) programme in Colombia. Initial implementation will begin in 2012 and is initially expected to reach seventy-five schools. The programme, which focuses on mathematics and social science education for students in Grades 4 and 5, will provide training and support to help teachers incorporate mobile technologies and digital resources into their curriculum. While this project is very similar to Chile's Puentes Educativos, one notable difference is that the Colombian Ministry of Education is the responsible agency for the programme. It remains to be seen how this factor will impact the project's success or sustainability.

A third mobile learning initiative focused on teaching and learning in Latin America, called Seeds of Empowerment, began in 2006 at Stanford University in the United States. Originally conceived as a research project at the university's School of Education, the Seeds of Empowerment programme aims to increase access to basic education for children living in extremely marginalized communities around the world. Researchers design mobile devices and platforms to deliver educational content and partner with local organizations to provide the devices to students and schools. The first Seeds of Empowerment projects in Latin America were launched in 2008 in schools in Argentina, Mexico and El Salvador, and additional projects are anticipated in Bolivia, Brazil and Uruguay in 2012.

Early Seeds of Empowerment projects provided students with a device called TeacherMate, which was designed specifically for the programme, but in current projects students use smartphones with Android or iOS operating systems to access an educational platform called the Stanford Mobile Inquiry-based Learning Environment (SMILE). The SMILE application is a 'tool for cognitive evaluation' that allows students to perform self-evaluations and peer-assessments based on the day's learning (Muñoz-Reyes, 2011). Students use the application to generate questions about a particular lesson or curricular unit, working individually or in groups to compose questions on a topic and search for multimedia support to illustrate their questions. The application compiles the students' questions and uses them to create an assessment, which students complete on the mobile device, ranking questions in addition to answering them. Results are generated in real time, allowing the teacher and students to see

which questions are ranked the highest, which are the easiest, and which are giving students the most trouble. The first Seeds of Empowerment project in Latin America to use the SMILE platform was launched in 2011 in the Argentine province of Misiones and involved the support of the provincial government, the telecommunications company Telecom and a local non-governmental organization (NGO). The project was initially implemented in ten rural and peri-urban public schools and is expected to expand to twenty schools in 2012.

COMPARATIVE ANALYSIS OF HIGHLIGHTED INITIATIVES

This section compares the initiatives described above in terms of the approach to providing mobile devices, the target populations, the scale and reach of the programmes, and the level of private-sector participation.

APPROACH TO PROVIDING MOBILE DEVICES

One of the decisions to be considered when designing a mobile learning programme is whether to provide mobile devices to students and educators or to employ a bring-your-own-technology (BYOT) approach, which relies on the mobile devices already owned by programme participants. Of the seven initiatives detailed above, only two use a BYOT approach: the PSU Móvil project in Chile and the Evaluación de Aprendizajes a través de Celulares pilot project in Paraguay both ask students to use their own mobile devices for assessment and test preparation. The remaining programmes provide devices to the participants.

There are benefits and drawbacks to each of these approaches. When the devices are provided to participants, the project's designers can choose the specific device to use, ensuring that it has all the necessary functionalities and is compatible with any mobile learning applications included in the programme. All of the initiatives described above that provide devices elected to use smartphones for their mobile learning programmes. The advantages of smartphones over standard mobile phones include higher processing capacity, larger screens and touch interfaces, more advanced connectivity standards (3G or 4G), and open operating systems that can support a variety of third-party applications and can be permanently upgraded or modified. A disadvantage of smartphones, and programme-provided devices in general, is the high purchasing cost, which may reduce the potential for programme expansion and sustainability.

Programmes using the BYOT approach are significantly less expensive and can be implemented more quickly, relying on the mobile devices that most students and educators in the region already own. However, the majority of these devices are standard, 2G mobile phones. While these phones generally support Global System for Mobile (GSM) connectivity and text messaging, and may have additional features such as cameras, music players and Wireless Application Protocol (WAP) navigators that allow users to connect to the internet, their connections tend to be slower and their operating systems have fewer options for upgrading and running third-party applications. BYOT programmes may reduce costs and

implementation time, but they will be limited by the technological capacity of the devices currently in use in the target population.

TARGET POPULATIONS

Four out of the seven mobile learning initiatives – Colombia's Programa Nacional de Alfabetización, the two BridgeIT initiatives and the Seeds of Empowerment project – selected their target populations based on socio-economic status, aiming their programmes at the region's most vulnerable populations. Approximately one-third of Latin America's population lives below the poverty line, and one-third of the region's poor people live in rural areas (ECLAC, 2010*b*). The combination of high levels of poverty with large numbers of people living in hard-to-reach locations makes mobile learning a particularly viable educational strategy, as mobile technologies can provide a low-cost alternative to computers and internet connectivity plans for areas lacking in funds and telecommunications infrastructure.

The target populations of the other three initiatives were based on the participants' role within the education system (e.g. student, teacher or administrator) and their educational level. The Mobiles for Supervisors programme in Argentina aims to assist school system supervisors in their work, while the Evaluación de Aprendizajes a través de Celulares project in Paraguay and the PSU Móvil programme in Chile are focused on students at the beginning and end of secondary school, respectively.

PROGRAMME SCALE AND REACH

Four out of the seven initiatives are pilot programmes which operate on a relatively small scale. The smallest, perhaps because it is an academic research project rather than a public policy initiative, is the Seeds of Empowerment programme led by Stanford University. Although there are current plans to expand the programme to additional countries and provinces, each individual project is designed to work with a small number of schools. Of a similar size is Colombia's Raíces de Aprendizaje Móvil programme, which will be implemented in seventy-five schools during its first stage.

Chile's Puentes Educativos and Paraguay's Evaluación de Aprendizajes a través de Celulares, while still pilot projects, have a slightly wider reach. Puentes Educativos is expected to be implemented in over 200 schools and reach more than 20,000 primary-school students – roughly 4% of the public schools in the country and 2% of the students enrolled in primary education. The Evaluación de Aprendizajes a través de Celulares project was implemented in 300 public secondary schools and designed for an original sample of 18,000 students, representing 15% of the country's schools and 10% of students enrolled in secondary education.

The remaining three initiatives operate on a significantly larger scale. Colombia's Programa Nacional de Alfabetización, which is still in its design phase, aims to reach 250,000 illiterate young people and adults – approximately 15% of the illiterate population – in its initial stages. The Mobiles for Supervisors programme in Mendoza, Argentina, while not necessarily large, has managed to reach 100% of its target population by providing mobile devices to all 350 school system supervisors in the province. The PSU Móvil programme in Chile, because it is

an online portal, also has the potential to reach all of its target population, though specific data is not available.

Project reach is clearly constrained by cost. The region's pilot programmes have kept expenses low by implementing projects on a small-scale, reaching a maximum of 15% of their target populations. The PSU Móvil programme has extended its reach by operating in an online environment, which significantly reduces operational costs. The Mobiles for Supervisors programme was able to reach all of its target population mainly because this population was small to begin with. The only large-scale and potentially high-cost programme in the region – the Programa Nacional de Alfabetización in Colombia – has yet to be implemented.

PRIVATE-SECTOR PARTICIPATION

All of the initiatives discussed in this paper received public-sector support, as this was one of the criteria for selecting the initiatives (see Methodology section). Four of these initiatives had some level of support or participation from the private sector as well. Private-sector participation in mobile learning initiatives can be peripheral or primary, ranging from the provision of goods and services to the assumption of key risks and responsibilities. The private sector can be defined as everything that is not the public sector (i.e. the government) (Draxler, 2008). The private sector can be further divided into two categories: corporations or businesses run for profit, and non-profit organizations such as foundations and NGOs. This last category, called civil society, is sometimes considered the 'third sector', distinct from government or business. In Chile, the PSU Educarchile programme is run jointly by the national Ministry of Education and the Fundación Chile, a civil society organization. At the other end of the spectrum, Colombia's Raíces de Aprendizaje Móvil programme is supported through partnerships with for-profit companies, including Nokia, Pearson and Telefónica.

The remaining two initiatives – Chile's Puentes Educativos and Stanford University's Seeds of Empowerment – involve participation from both for-profit companies and non-profit organizations. Both projects build on strong cooperation between organizations in the public and private sectors: the government supervises the programme and grants access to the institutions involved; for-profit companies provide educational content, equipment or connectivity; and local NGOs help adapt the programme to the specific needs of the community and assist with implementation. Puentes Educativos partnered with the ACHNU, a non-profit development organization that is responsible for implementing the project in Chile. The Seeds of Empowerment programme seeks a local partner for each project implementation. This model of multiple partners from the public and private sectors – called multistakeholder partnerships for education (MSPEs) – has been recommended by UNESCO and the World Economic Forum as an important strategy for meeting UNESCO's Education for All (EFA) objectives.

MOBILE LEARNING POLICIES

POLICIES

Surveys about existing mobile learning policies were sent to the national Ministries of Education of all thirty-four countries in Latin America. While only six countries provided responses – Chile, Colombia, Guatemala, Mexico, Nicaragua and Uruguay – they are representative of the range of socio-economic development in the region. For example, Chile and Uruguay have some of the region's highest GDPs per capita, and Nicaragua and Guatemala have some of the lowest, with Colombia and Mexico spaced evenly in between (World Bank).

Of these six countries, only Colombia reported active government support for mobile learning, both through public funding of specific programmes and through governmental initiatives that include actions and incentives for mobile learning development. Colombia was also the only country to report awareness of current mobile learning efforts in schools. The Ministry of Education representative who answered the survey indicated that there is a low level of mobile learning activity at the primary education level, but that it is in the early stages of development, with scattered projects rarely extending beyond a single school or institution. The representative was not aware of any mobile learning activity at the secondary or postsecondary level.

The representative from Uruguay referenced a private-sector project for teaching English called Soloingles.com, but the government does not support or promote this programme in any way. The remaining representatives stated that their governments were not currently encouraging the use of mobile technologies in education on a national level, nor were they aware of any local policies to promote mobile learning. Respondents from these countries were asked about the possibilities of national support for mobile learning in the future. The representative from Nicaragua indicated that the government plans to start building alliances with mobile phone companies as part of their corporate social responsibility (CSR) programmes. Chile's representative stated that while there are no immediate plans to support mobile learning, the topic could become a priority in the future. Guatemala's representative did not report any expectations of mobile learning appearing on the country's educational agenda in the future.

None of the Ministry of Education representatives could identify any educational technology plans, guidelines or strategies that referenced mobile devices. Chile's survey response mentioned a report summarizing an academic research project in mobile learning, but no educational planning documents. The Chilean representative did, however, indicate that developing clear strategies or policies for mobile learning is a current topic of discussion within the Ministry of Education.

These responses do not mean that mobile learning is being actively discouraged. None of the survey respondents indicated the existence of any national policies to ban or inhibit the use of mobile technologies for educational purposes – for example, regulations that forbid mobile

phone use in schools. Rather than being supported or suppressed by specific policies, mobile learning simply seems to lack a place on the educational agenda for most Latin American countries. It is worth mentioning that Uruguay's representative offered an explanation for this situation. The country's Ministry of Education is currently putting a great deal of effort into the national 1:1 programme, which aims to provide a netbook to every student in the country. The representative felt that the resources allocated to implementing this programme did not leave space on the country's educational ICT agenda for mobile learning policies in the near future. Given the large number of 1:1 initiatives throughout the region, this perception may be shared by other countries as well. In 2010 there were at least seventeen countries in Latin America with 1:1 programmes, with aims to deliver a total of 7.5 million netbooks to students by 2012 (Severín and Capota, 2011; IIEP-UNESCO, 2012). While these programmes represent a large expenditure that may not leave funds for mobile learning projects at the moment, they also indicate a strong commitment on the part of the region's governments to integrate ICT into education. This commitment may lead to potential opportunities for mobile learning policies and programmes in the future.

STAKEHOLDERS

Survey respondents were also asked about their perceptions of the main stakeholders interested in promoting or restricting the use of mobile phones in education. The survey listed the following possible stakeholders: the national or federal government, regional educational authorities, local educational authorities, telecommunications providers, teachers, students, parents and scholars. The survey also included an 'other' option for respondents to add stakeholders who were not included in the list.

The answers provided were somewhat varied. Half of the respondents felt that students and telecommunications providers were the primary groups interested in promoting the use of mobile phones in education. A smaller number pointed to national governments and regional educational authorities as key stakeholders who support mobile learning. Opinions about the role of teachers and parents were divided. Half of the respondents classified teachers as objecting to the use of mobile phones in schools, while one-third indicated that teachers were in favour of mobile learning. Similarly, equal numbers of respondents perceived parents as opposing or supporting mobile learning. One respondent also named civil society organizations as promoters of mobile learning efforts. Table 1 shows the exact numbers of responses for each stakeholder category.

Table 1. Perceptions of mobile learning stakeholders

Stakeholders	Promoting use	Preventing use
National/federal government	2	
Regional educational authorities	2	
Local educational authorities	1	
Telecommunications providers	3	
Teachers	2	3
Students	3	
Parents	2	2
Scholars	1	1
Other: Civil society organizations	1	

FACTORS INFLUENCING MOBILE LEARNING

Mobile learning policies and social attitudes toward mobile learning are influenced by a number of social, economic and political factors. The following sections identify the various drivers, enablers, barriers and success factors for current and future mobile learning efforts in Latin America.

DRIVERS

LITERACY AND BASIC EDUCATION NEEDS FOR VULNERABLE POPULATIONS

Raising literacy rates and providing basic education for vulnerable populations are among the primary educational goals for the region. A recent study from the Information System on Educational Trends in Latin America (SITEAL) indicated that a high percentage of students in the region do not complete primary education. In six of the eleven countries studied, almost half of the country's municipalities reported that 20% or more of their population aged 15 to 19 had not finished primary school (Itzcovich, 2011). The majority of these students were living in rural areas with large indigenous populations or in households with low educational climates, where parents and relatives had not finished primary education either. A similar situation applies to illiteracy in Latin America. About 8.3% of the region's adult population is illiterate, and functional illiteracy affects 29% of the adult population in eighteen countries in the region (OEI/ECLAC/SEGIB, 2010). Illiteracy rates are higher in rural populations, where people are twice as likely to have an extremely low education level than people living in cities (SITEAL, 2005).

The ubiquity of mobile phones in the region, even in rural areas and impoverished communities, makes mobile learning a viable option for reaching vulnerable populations. The strategy of delivering educational content through standard mobile phones is particularly well-suited for use in rural areas where educational resources are scarce and fixed broadband connections are unavailable or unreliable. The Programa Nacional de Alfabetización in Colombia, which is scheduled to be implemented in 2012, offers a good example of using mobile technologies to meet the educational needs of disadvantaged populations. If the initiative is successful, there is a strong potential that it will be replicated by other countries in the region.

ADMINISTRATIVE MANAGEMENT NEEDS FOR EDUCATIONAL SYSTEMS AND INSTITUTIONS

There is a significant need for improvement in the administrative management of educational systems and institutions in Latin America. The Mobiles for Supervisors programme implemented by the provincial government of Mendoza in Argentina has demonstrated that mobile technologies can offer substantial benefits to school system managers. Through a quick and low-cost strategy – delivering mobile devices to key actors in the education system – major improvements were achieved in terms of communication, data collection and access to computer systems. This programme may serve as a model for other provinces and countries seeking to improve administrative management of their public school systems.

ENABLERS

HIGH PENETRATION RATE OF MOBILE PHONES

The penetration rate for standard mobile phones in Latin America is very high, even among lower-income groups. Though standard mobile phones may offer fewer educational possibilities than smartphones, their widespread dissemination makes them an excellent low-cost option for mobile learning programmes, as the majority of the population already owns a device. The PSU Móvil programme in Chile and the Evaluación de Aprendizajes a través de Celulares project in Paraguay are examples of initiatives that leverage the technology students already have to implement mobile learning projects quickly and inexpensively. Administrators and teachers can also use mobile technologies to communicate important information to students and parents, using the text messaging features available on all standard mobile phones.

FAMILIARITY WITH MOBILE DEVICES

Social attitudes play an important role in determining the success of educational policies. If students and teachers are resistant to using mobile technologies for education, governments and organizations will find it difficult to implement mobile learning programmes in schools. A useful predictor of whether a new technological solution will be adopted is the perceived ease of use of the technology in question (Davis et al., 1989). A device that is already being used on a daily basis is much more likely to be accepted than one that is unfamiliar. From this standpoint, mobile phones in Latin America offer a clear advantage vis-à-vis other devices such as personal computers (PCs), laptops and netbooks. There are only an estimated 17 computers for every 100 inhabitants in the region, compared with an average of almost one mobile phone per person, and in some countries there are as many as 1.3 or 1.4 devices per inhabitant (Katz, 2011). Thus, while there are still a great number of teachers in the region, especially among the more disadvantaged populations, who are not used to working with computers and tend to see them as complicated, difficult-to-use devices, it is highly likely that these same teachers are comfortable with mobile phones and confident in their ability to use them. This scenario was noted by project managers implementing the Puentes Educativos

programme in Chile, who observed that many teachers chose not to show videos or multimedia presentations to their classes on school computers because they did not feel comfortable with their computer skills. The teachers were much less insecure about screening videos through the mobile phones provided by the programme.

BARRIERS

PRIMACY OF 1:1 PROGRAMMES

As mentioned previously, a potential obstacle for the advancement of mobile learning in Latin America is the region's current focus on 1:1 programmes, which aim to provide every student and teacher with a laptop or netbook. To be implemented successfully, these programmes require substantial funding and attention: governments need to improve telecommunications infrastructure, purchase and distribute equipment, develop digital content, train teachers, and provide maintenance and technical support, among other things. Because the efforts being made to integrate ICT into education are already considerable, it is possible that some governments consider their educational ICT agenda to be saturated, and that mobile learning initiatives will need to wait until there is more 'room'.

REGULATIONS RESTRICTING THE USE OF MOBILE PHONES IN SCHOOLS

Another obstacle to consider is the existence of regulations restricting the use of mobile phones in the classroom, targeted at students and, in some cases, teachers. The first appearance of these types of regulations, in 2005 and 2006, coincided with the mass dissemination of mobile phones within the region's middle- and low-income groups and especially among young people. In reaction to a massive inflow of mobile devices, which were, and in many cases still are, viewed as fundamentally disruptive to teaching and learning, local education authorities established strict regulations banning the use of mobile phones in schools.

In the years that followed, many of these restrictions were loosened or overturned, either voluntarily or through legal challenges. In Colombia, for example, a Constitutional Court decision of 2007 stipulated that mobile phone use could be regulated but could not be banned because it 'would undermine the rights of students' (Ministry of Education of Colombia, SAC 226.774). A similar situation occurred recently in the province of Entre Ríos, Argentina, where the provincial Ministry of Education sought to punish a student for using her mobile phone in class. The Justice of the Province ruled that the restriction was unconstitutional (Riani, 2011).

While many of these restrictions have been removed, the use of mobile phones in the region's schools is still a source of controversy for educators, and it is important for promoters of mobile learning to approach this issue carefully. Universal bans on mobile phones, which preclude the possibility of their use for pedagogical purposes, should be discouraged, without neglecting the need for reasonable regulation of mobile phone use in the classroom.

HIGH COST AND LOW AVAILABILITY OF 3G CONNECTIVITY

One of the main advantages of mobile phones over portable computers is the ability to use the mobile network to access the internet. While standard mobile phones have considerably slower internet access and fewer browsing capabilities, smartphones, which generally use 3G or 4G technology, provide internet speeds equivalent to those of fixed broadband. However, the availability of smartphones and 3G connectivity in Latin America is still limited, concentrated mainly in large cities. While for OECD countries the average population coverage of 3G or 4G networks is about 90%, in Latin America – in the few cases for which data is available – coverage is 55% or less (ITU, 2011). This lack of coverage places serious limitations on mobile learning programmes that use smartphones or require high-speed connectivity.

Analysts forecast a sharp increase in the penetration of mobile broadband services in Latin America within the next four to six years (Rojas, 2010; BNAmericas, 2011; Katz, 2011). Nevertheless, it is reasonable to assume that the possibilities for advantageous mass use of this technology in the region's educational systems will depend on whether governments decide to take on this issue in their political agendas. Without strong leadership to drive the development and availability of mobile broadband beyond the boundaries of market efficiency, the prospects of its availability to all people at affordable prices are limited.

SUCCESS FACTORS

COOPERATION BETWEEN PUBLIC AND PRIVATE SECTORS

According to the regional education experts surveyed and interviewed for this paper, cooperation between the public and private sectors is a key factor in the success of any mobile learning programme. The most successful programmes tend to be those in which the government works with private companies as well as academic and non-profit organizations, such as universities and NGOs, to plan and implement the project. Partnerships with telecommunications companies are particularly important, as these companies provide the equipment, infrastructure and connectivity essential to mobile learning programmes.

The Seeds of Empowerment programme is a good example of successful cooperation between different sectors. The programme has implemented mobile learning pilot projects in Argentina, Costa Rica, El Salvador and Mexico, and additional pilots are expected to be launched in Bolivia, Brazil and Uruguay in 2012. According to the programme's regional coordinator, one of the primary objectives in planning these projects was to secure not only the support of national or local governments, but also to ensure the participation of telecommunications companies on the one hand, and foundations or local NGOs linked to social development on the other.

GOVERNMENT LEADERSHIP AND OWNERSHIP

Both the education experts and the government officials contacted for this paper agreed that governments do not always provide adequate leadership in the field of ICT and education. While many of those interviewed said they believed the government should play a key role in promoting innovative initiatives for ICT in education, they also admitted that this is often not the case. Part of the problem might be a lack of ownership at the state level. If, for instance, an ICT education policy is treated as a general state policy rather than a policy specific to the education sector, it might receive more attention and achieve better results. Another issue may be a lack of communication and cooperation between different agencies within the government. Colombia provides a good example of this kind of cooperation. In 2009 the government created the Ministry of Information and Communications Technologies (formerly the Ministry of Communications). Since then, the Ministry of ICT has played an important role in the design and implementation of policies for ICT integration into education, working with the country's Ministry of Education to develop and promote a national ICT plan, called Colombia Digital, which aligns with many of the goals and objectives of the country's educational agenda.

RECOMMENDATIONS

The following recommendations, based on an analysis of current mobile learning programmes as well as the survey, literature review and interviews conducted for this paper, may provide useful advice to education leaders and policy-makers involved in designing mobile learning policies and initiatives in Latin America.

1. Build on current ICT education programmes

Many countries in Latin America currently have government-sponsored 1:1 programmes that aim to provide one laptop or netbook to every student in the country. While this may not leave many resources for mobile learning programmes at the present time, the prevalence of 1:1 programmes has brought ICT integration to the forefront of many countries' educational agendas. Governments are now more likely to be open to new ICT options in education, including mobile learning. They will also have more trained technical personnel and specific departments responsible for implementing ICT programmes. Mobile learning policies should build on the frameworks in place for 1:1 programmes to increase support for the initiatives and ensure that they are feasible.

2. Capitalize on existing education portals

In recent years, many countries in the region, including Argentina, Chile, Colombia and Uruguay, have developed high-quality education portals and a large library of digital content for educators and students. These existing portals can be used to stimulate and strengthen mobile learning by enabling access to content via mobile devices. Mobile learning initiatives should focus first on promoting mobile access to education portals and content through mobile phones, including standard, 2G phones. A second step might be to form agreements with telecommunications companies to provide access to these portals for free. Facilitating mobile access to the digital education resources already in place would both increase the usefulness of these resources and promote the use of mobile phones for educational purposes.

3. Tie mobile learning policies to regional education needs

Latin America still faces many educational challenges, including adult illiteracy, high drop-out rates, poor educational quality, and inadequate access to education for both teachers and students. These problems generally affect the more disadvantaged socio-economic groups in the region, especially in rural environments where educational resources are limited and internet connectivity is extremely costly. Mobile learning initiatives have the potential to make a significant impact on education in these communities, either by supplying mobile devices and connectivity plans or by developing educational content that can be accessed for free through standard mobile phones. Colombia's Programa Nacional de Alfabetización, which includes a plan for literacy education for 250,000 people through mobile phones, is an example of a mobile learning initiative that specifically addresses a pressing educational need in the region. Initiatives and policies aimed at these types of issues are the most likely to gain the governmental and social support necessary to develop the programmes.

4. ***Re-examine regulations restricting mobile phone use in schools***

    Mobile learning policies can be seen as an opportunity to review institutional regulations that restrict the use of mobile phones in schools. Initiatives should promote formal and informal discussion forums within educational systems and institutions, with the aim of designing new guidelines for mobile phone use by students and teachers.

5. ***Consider long-term maintenance costs***

    Long-term maintenance costs for ICT programmes in education are significant and tend to outweigh initial costs. A recent survey of netbook projects in developing countries found that the projects' initial costs represented around one-quarter the total outlay, while operational costs – for technical support, training, connectivity, electricity, subscriptions and digital content, among other things – accounted for 63% of the total (Vital Wave Consulting Group, 2008). An additional 13% was made up of 'hidden costs': unforeseen or underestimated expenses such as hardware replacement due to damage or theft, or costs associated with the planning and concluding stages of the project. Because mobile devices are less expensive to purchase than laptops or netbooks, a mobile learning programme may incur lower initial costs than, say, a 1:1 programme. However, the long-term costs are likely to be similar to, and in some cases more than, equivalent programmes that use computers. In developing mobile learning initiatives, it is important to calculate and consider the total estimated costs of implementing and maintaining the programme, not just the lower initial cost.

6. ***Create a plan for electronic waste disposal***

    Recent publications have pointed out that the rapid increase in sales of ICT equipment is leading to greater amounts of electronic waste, or e-waste. Because of the absence of recycling or waste treatment programmes in Latin America, the accumulation of e-waste in the region could reach critical levels in the near future (UNESCO/RELAC, 2010; Silva, 2009). It is essential that governments begin to contemplate solutions to this problem and develop ICT integration policies that address the appropriate disposal of e-waste. In spite of the educational potential of mobile learning programmes, their legitimacy could be questioned if they result in thousands of tons of waste that the region is not prepared to absorb safely.

CONCLUSION

After a review of current mobile learning initiatives and policies in Latin America, it is possible to make several predictions about the future of mobile learning in region. First, it is likely that countries currently implementing widespread 1:1 programmes – including Argentina, Peru, Uruguay and Venezuela – will not launch large-scale mobile learning initiatives in the near future, as they have already made significant investments in purchasing and maintaining laptops or netbooks. Nevertheless, mobile learning might eventually be added to the educational agenda in these countries as a complementary strategy. In preparation for this scenario, further research should be done on the technological, logistical and political feasibility of developing large-scale mobile learning initiatives in the region.

Secondly, mobile learning has the potential to address specific educational needs in Latin America, from increasing literacy and basic education skills for vulnerable populations to improving the administrative management of education systems. It is probable that future mobile learning policies and programmes will aim to ameliorate key educational issues in the region and will target particular populations based on their socio-economic status. Mobile learning initiatives that focus on pressing educational needs are the most likely to receive funding and support at the local, national and international levels.

Finally, telecommunications forecasts for Latin America indicate that by 2015, mobile subscribers using 3G and 4G networks will outnumber those without 3G (Rojas, 2010; BNAmericas, 2011; Katz, 2011). The proliferation of 3G connectivity and devices, combined with the overall expansion of mobile broadband coverage in the region, greatly increases the opportunities for mobile learning and may lead to a substantial rise in the number of mobile learning initiatives over the next few years. As smartphones become more affordable and accessible, BYOT programmes are likely to become more common. Educators and policy-makers might look to educational research from Europe and North America, where high percentages of students own mobile devices, for models of scalable and sustainable BYOT programmes.

As governments and institutions move forward with mobile learning initiatives, it is essential to gather and analyse data on the results of current policies and programmes, to inform future planning and implementation. Historically, Latin America has produced little data or evaluative information on its public policies; this trend is confirmed by the dearth of information available on mobile learning initiatives in the region. There have been few efforts to systematize data on mobile learning programmes, and even fewer attempts to assess programmes' results or impacts. Major improvements in data collection and analysis are needed to inform the planning of future mobile learning efforts in the region and help ensure their success. It is also important to disseminate this information widely, in order to generate interest and support for mobile learning among parents, educators and policy-makers.

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APPENDIX A: Countries surveyed

Latin America:

- Argentina
- Bolivia
- Brazil
- Chile
- Colombia
- Costa Rica
- Cuba
- Ecuador
- El Salvador
- Guatemala
- Honduras
- Mexico
- Nicaragua
- Panama
- Paraguay
- Peru
- Dominican Republic
- Uruguay
- Venezuela

Caribbean:

- Antigua and Barbuda
- Bahamas
- Barbados
- Belize
- Curazao
- Dominica
- Grenada
- Guyana
- Jamaica
- St. Kitts and Nevis
- St. Vincent and the Grenadines
- St. Lucia
- Suriname
- Trinidad and Tobago
- Virgin Islands

APPENDIX B: Education and ICT experts interviewed

Name	Country	Institution/Organization	Position
Javier Firpo	Argentina	Intel	Educational and CSR Programmes Director for Latin America
Cynthia Giolito	Argentina	Telecom Argentina	Corporate Social Responsibility Manager
Raúl Militello	Argentina	Mendoza Province's General Directorate of Schools	Information Technologies Coordinator
Inés Dussel	Argentina	FLACSO Argentina	Research Professor in Teaching, ICT and Media
Favio Tarasow	Argentina	FLACSO Argentina	Education and New Technologies Programme Coordinator
Natalia Fernández Laya	Argentina	FLACSO Argentina	Research Professor in ICT and Education
Fernando Salvatierra	Argentina	University of Buenos Aires	Research Professor in ICT and Education
Marcelo Milrad	Argentina	Linnaeus University, Suecia	Centre for Learning and Knowledge Technologies Director
Guilherme Canela Godoi	Brazil	UNESCO Brasilia	Communication and Information Specialist
María Cristina Escobar	Chile	Ministry of Education	Head of the Technologies for Management and Learning Area, Enlaces Programme
Jaime Sánchez	Chile	University of Chile	Director, Centre for Computing and Communication for the Construction of Knowledge
Miguel Nussbaum	Chile	Catholic University of Chile	Head Professor in the Computer Science Department
Ignacio Jara	Chile	Catholic University of Chile	Deputy Director of the Centre for Studies in Education Policy and Practice
Gonzalo Plaza	Chile	Puentes Educativos	Project Manager
Castor Toledo	Chile	Chile Foundation	ICT and Education Specialist
Juan Silva Quiróz	Chile	University of Chile	Director, Centre for Research and Innovation in Education and ICT
Sandra Barragán	Colombia	One Laptop per Child	Country Coordinator

Name	Country	Institution/Organization	Position
Merly Sulgey Gómez Sánchez	Colombia	Ministry of Education	Educational Innovation and Evaluation Coordinator, Office of Educational Innovation for Use of New Technologies
Martha Castellanos	Colombia	Ministry of Education	Specialist, Office of Educational Innovation for Use of New Technologies
Claudia Urrea	Colombia	Ministry of ICT	Executive Director of the Computers for Schools Programme
Leda Muñoz	Colombia	One Laptop per Child	Learning Director for Latin America
Claudia Muñoz-Reyes	Costa Rica	Omar Dengo Foundation	Executive Director
Jesús Vicente Flores Morfín	Mexico	National Autonomous University of Mexico	Secretary for Educational Innovation
Hernán Medrano Rodríguez	Mexico	Latin American Institute of Educational Communication	Director, Centre for Communication Studies and Educational Technology
Oscar Becerra	Mexico	Education Secretariat, Nuevo León	ProForPe Director-General of the Institute of Research, Innovation and Graduate Studies in Education
Graciela Rabajoli	Peru	n.a.	Former General Director of Educational Technology of the Ministry of Education
Fernando Gamboa Rodríguez	Spain	Universidad de La Laguna	Professor, School of Computer Science
Carina González	United States of America	Stanford University, Seeds of Empowerment Project	Regional Director for Latin America
Ana Olmedo	Uruguay	Plan Ceibal	Content Area Coordinator
Javier Firpo	Uruguay	ORT University	Research Professor in ICT and Education

APPENDIX C: Interview guide

INTERVIEW GUIDE

1. Do you know of any initiatives for the use of mobile phones in education? Which ones? When and where were they implemented? What do they consist of? Do you know or have any documentation regarding: the project's description, implementation, evaluation and/or results?
   - For which educational level?
   - Where does funding come from?
   - Who are the main stakeholders involved?

2. Are there specific policies to promote or prevent the use of mobile phones in education in your country/province/region? Do you know of specific policies in other countries in Latin America and the Caribbean? What are their characteristics?
   - For which educational level?
   - Where does funding come from?
   - Who are the main stakeholders involved?

3. Does your country/province/region have any form of regulation linked to the telecommunications market (e.g. tax reduction) that can potentially help or hinder the use of mobile phones in education?

4. If there are no specific policies yet, are there any indications that your country/province/region will promote such policies in the short or medium term? How?

   ☐ Yes, by explicitly stimulating initiatives in this field.

   ☐ Yes, by introducing subsidy programmes or project funding.

   ☐ Yes, by developing a dedicated governmental action plan.

   ☐ Yes, otherwise.

   ☐ No, not yet but it could well develop into a priority in the medium-term future.

   ☐ No, we do not expect this to be or to become a priority.

   Comments or additional information:

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5. Who are the main stakeholders involved in the use or prevention of use of mobile phones in education in your country/province/region?

6. Which are the main factors that drive, enable, impede or determine the success of mobile learning policies in your country/province/region?
   • Drivers:
   • Enablers:
   • Barriers:
   • Success factors:

7. Do you know of any reference to the use of mobile phones in education in any government or state/regional educational strategy, educational technology plan or similar documents?

   Please specify as much data as possible to locate the document and reference:

8. Does the government in your country/province/region have a clear strategy or policy regarding the use of mobile phones in education?

   ☐ Yes, in operation.

   ☐ Yes, in development.

   ☐ Not yet, but under discussion.

   ☐ No, with no preparations yet.

   ☐ No, we don not anticipate this in the near future.

   ☐ Do not know.

   Comments or additional information:

APPENDIX D: Questionnaire sent to national Ministries of Education

QUESTIONNAIRE

Introduction

UNESCO is committed to exploring the opportunities provided by mobile technologies, particularly mobile phones, to extend access to education and to quality learning experiences, consistent with the goals of Education for All (EFA). A major agreement between Nokia and UNESCO has provided the opportunity to explore this issue in more detail, having in particular two objectives:

1. to provide national governments and education institutions with policy recommendations that can enable and support education delivery through the safe, affordable and sustainable use of mobile technologies; and

2. to articulate a vision for the role of mobile learning in society by 2030, setting an ambitious vision of the future to which policy-makers can aspire.

In this context, a first step consists of taking stock of how governments around the world see mobile learning in a wider policy context and how they are currently supporting its development. This stock-taking exercise takes the form of a series of regional reviews for which the current questionnaire has been developed.

UNESCO understands that mobile learning, in particular through mobile phones, might not be sufficiently developed everywhere as to generate a set of dedicated national, regional or local policies. Even in this scenario, the answers to this questionnaire will provide an opportunity to better understand the policy context for mobile learning.

UNESCO takes this opportunity to thank you for your time and support. Should you need additional details about how UNESCO promotes mobile learning or wish to get in touch with the unit responsible for this work, please email Francesc Pedró, chief ED/PDE/PAD, at f.pedro@unesco.org.

Instructions

1. You are invited to include in your response additional documents or links to information on the web. Please specify the questions the documents address, as well as relevant page numbers.
2. Feel free to give further explanation or comments to your replies in the area reserved for that after each question.
3. Do not hesitate to tick off multiple answers when appropriate or necessary.

Question 1

Is your government actively supporting the use of mobile phones in education?

☐ Yes, through initiatives by institutions and engaged individuals.

☐ Yes, through specific projects or programmes with dedicated public funding.

☐ Yes, through specific projects or programmes with dedicated private funding.

☐ Yes, through government initiatives including specific measures and incentives.

☐ Yes, otherwise. Please specify:

☐ No.

☐ Do not know.

If you have responded 'Yes', please provide some contact details or web pages below, or attach relevant documents that could provide additional details about the programmes or projects being carried out, what agency/organization is responsible, more information about the sources of funding, etc.

Are you aware of any initiatives promoted by local governments that actively support the use of mobile phones in education?

☐ Yes.

☐ No.

If 'Yes', please identify the local government, primary contact, email address, and brief description of programme, subject area(s), and grade level(s).

Question 2

If your answer to Question 1 was 'Yes', can you specify the level of activity for each of the following educational subsectors?
- Low: there is some activity, but just in an early stage of development, probably with scattered activities rarely going beyond one particular school or institution.
- High: there are programmes or activities that have reached a critical mass of schools or learners, as to become publicly noticeable.
- Very high: there are programmes or activities that can be said to be widely used by schools or learners.

	Non-existing	Low	High	Very high
Primary education (ISCED 1)	☐	☐	☐	☐
Lower secondary (ISCED 2)	☐	☐	☐	☐
Upper secondary (ISCED 3)	☐	☐	☐	☐
Postsecondary/non-tertiary (ISCED 4)	☐	☐	☐	☐
Tertiary (ISCED 5)	☐	☐	☐	☐

*ISCED = International Standard Classification of Education

Do you have any additional comments?

Question 3
If your answer to Question 1 was 'No', are there indications that your country will become an active supporter of mobile learning in the near future?

☐ Yes, by explicitly stimulating initiatives in this field.

☐ Yes, by introducing subsidy programmes or project funding.

☐ Yes, by developing a dedicated governmental action plan.

☐ Yes, otherwise.

☐ No, not yet but it could well develop into a priority in the medium-term future.

☐ No, we do not expect this to be or to become a priority.

Do you have any additional comments?

Question 4
If your answer to Question 1 was 'No', is your government actively trying to prevent the use of mobile phones in education?

☐ Yes, otherwise.

☐ Yes, otherwise.

☐ Do not know.

If 'Yes', does this policy refer to any particular (or all) of the following educational subsectors?

Primary education (ISCED 1)	☐
Lower secondary (ISCED 2)	☐
Upper secondary (ISCED 3)	☐
Postsecondary/non-tertiary (ISCED 4)	☐
Tertiary (ISCED 5)	☐

*ISCED = International Standard Classification of Education

Can you please specify the nature of the policy or action(s) that are being taken?

Question 5
Who are the main stakeholders involved in the use or prevention of use of mobile phones in education in your country?

Stakeholder	Use	Prevention of use	Not applicable
The government			
Regional educational authorities			
Local educational authorities			
Telecom providers			
Mobile phone/hardware makers			
Teachers			
Students			
Parents			
Education specialists/scholars			
Other (please specify)			

Question 6
There are social, economic and political factors influencing public policies and social attitudes about mobile learning. Given the circumstances the same factors could be seen at one point as a driver and at another point as a barrier. This could be the case, for example, regarding connectivity costs, teacher training, policy support, etc.

With reference to the use of mobile phones in education, in your country what would you consider to be the main:

- Drivers:
- Enablers:
- Barriers:
- Success factors:

Question 7
Is there reference to the use of mobile phones in education in any government or state/regional educational strategy, educational technology plan or similar documents?
Policy document 1:
Policy document 2:
Policy document 3:

Please specify the nature of the reference:
Policy document 1:
Policy document 2:
Policy document 3:

Question 8
In your country, does the education ministry (or another public agency from the education sector or a different area of government) have a clear strategy or policy regarding the use of mobile phones in education?

☐ Yes, in operation.

☐ Yes, in development.

☐ Not yet, but under discussion.

☐ No, with no preparations yet.

☐ No, we don not anticipate this in the near future.

☐ Do not know.

Question 9
Why is learning with mobile phones a consideration or an option in your country? And, if it is not an option, why not?

Question 10
Do you have any additional comments?

APPENDIX E: Complete list of identified mobile learning initiatives

Identified initiatives according to educational level

Educational Level		
	Primary and Secondary	Eduinnova (Chile)
		Evaluación de Aprendizajes a través de Celulares (Learning Assessment through Mobile Phones) (Paraguay)
		Minha Vida Mobile (My Mobile Life) (Brazil)
		Mobiles for Supervisors Programme (Argentina)
		Mobile-L Programme (Brazil)
		PSU Móvil (Chile)
		Puentes Educativos (Educational Bridges) (Chile)
		Raíces de Aprendizaje Móvil (Roots of Mobile Learning) (Colombia)
		Seeds of Empowerment (multiple countries)
	Postsecondary	Aprendizaje Móvil (Mobile Learning) Project at ITESM (Mexico)
		Aprendizaje Móvil (Mobile Learning) Project at UNID (Mexico)
		BlueGénesis (Colombia)
		CampusMovil.net (Chile)
		Postítulo de Especialización Superior en Educación a Distancia (Higher Postgraduate Specialization in Distance Education) (Argentina)
	Lifelong Learning	Kantoo (multiple countries)
		Programa Nacional de Alfabetización (National Literacy Programme) (Colombia)
		Soloingles.com (multiple countries)

PRIMARY AND SECONDARY LEVEL

Name:	Eduinnova
Country:	Chile
Agent responsible:	Eduinnova
Partner(s):	Microsoft, Intel, Pontificia Universidad Católica de Chile (Catholic University of Chile) and Fundación Chile (Chile Foundation)
Dates:	Began in 1995; ongoing
Target population:	Primary- and secondary-school students.
Problem addressed:	Difficulties in effective integration of digital technologies in the classroom; lack of collaborative learning through ICT.
Description:	Eduinnova began in 1995 at the Pontificia Universidad Católica in Chile as a research group dedicated to educational innovation processes. Since its inception, Eduinnova has sought to make a contribution to the development of educational processes through the use of ICT. On this basis, it developed proposals for technology-supported collaborative work (Computer Supported Collaborative Learning, CSCL). Since early 2000 the project began to investigate mechanisms and models for the use of mobile devices to develop collaborative activities in class, first using hand-held computers (personal digital assistants, or PDAs) and then around 2008 also experimenting with smartphones.
Objectives:	To improve the quality of education through the introduction of mobile technologies in the classroom.
Mobile device:	Smartphone (I-Mate SP5 in 2008)
Websites or documents consulted:	• http://www.eduinnova.com/ • Cortez, C. et al. 2004. Teaching Science with Mobile Computer Supported Collaborative Learning (MCSCL). Proceedings of the 2nd IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE'04). • Echeverría, A. et al. 2011. Face-to-face collaborative learning supported by mobile phones in Interactive Learning Environments, Vol. 19, No. 4, pp. 351–363.
Additional observations or comments:	A face-to-face interview was conducted with the project coordinator, Miguel Nussbaum, in November 2011.

Name:	Evaluación de Aprendizajes a través de Celulares (Learning Assessment through Mobile Phones)
Country:	Paraguay
Agent responsible:	Ministry of Education of Paraguay
Partner(s):	n.a.
Dates:	2011
Target population:	Original sample of 18,000 students in the first, second and third years of secondary education in 300 public schools. About 10,000 students participated.
Problem addressed:	Learning assessment system that is slow, expensive and inefficient in the use of material, human resources, logistical planning, etc.
Description:	Pilot programme to administer a learning assessment in Spanish language and literature and mathematics through students' mobile phones.
Objectives:	To reduce implementation costs and increase speed and efficiency for the assessment of students learning nationwide.
Mobile device:	Varied; students use their own mobile phones.
Websites or documents consulted:	• http://www.mec.gov.py/cms/entradas/291546-utilizaran-telefonos-celulares-para-diagnosticar-aprendizajes-en-colegios • http://www.mec.gov.py/cms/entradas/291554-destacan-alta-participacion-de-estudiantes-en-prueba-a-traves-de-celulares • http://noticiariomatematico.blogspot.com/2011/05/en-paraguay-toman-pruebas-con-telefonos.html • http://celumania.bligoo.com.ar/primera-experiencia-de-pruebas-con-celulares#content-top
Additional observations or comments:	None

Name:	**Minha Vida Mobile (My Mobile Life)**
Country:	Brazil
Agent responsible:	Vivo Brasil
Partner(s):	n.a.
Dates:	Began in 2008; ongoing
Target population:	Primary- and secondary-school teachers and students.
Problem addressed:	Lack of audiovisual content in schools.
Description:	Educational and cultural project to encourage the use of mobile phones for the production of audiovisual content in schools. The programme consists of a content and interaction portal (www.mvmob.com.br) and various activities and competitions.
Objectives:	• To train teachers and students to produce audiovisual content using mobile phones. • To stimulate creativity in schools through a network of interactive learning and cultural exchange.
Mobile device:	Not specified
Websites or documents consulted:	http://www.mvmob.com.br
Additional observations or comments:	None

Name:	**Mobiles for Supervisors Programme**
Country:	Argentina, Mendoza Province
Agent responsible:	Dirección General de Escuelas de Mendoza (Mendoza General Directorate of Schools, DGE)
Partner(s):	n.a.
Dates:	Began in March 2010; ongoing
Target population:	Mendoza's school system supervisors of all levels and modalities (about 350 supervisors).
Problem addressed:	Communication and information access difficulties for school system supervisors and school principals.

Description:	In March 2010, a BlackBerry mobile phone was distributed to each school system supervisor in the Province of Mendoza to serve as a tool to support their management tasks. Among the main features of the devices and plans contracted are:
	• Unlimited calls between devices in the programme
	• Up to eight hours of out-of-network calls per month
	• Unlimited internet access
	• Access to DGE's web systems
	• Use of email from the phone
	• Display of Word, Excel, PowerPoint and PDF files
	When a supervisor visits a school that does not have internet connectivity, necessary information can still be accessed from the phone through the DGE's web system, including:
	• Human Resources System
	• DGE Intranet with:
	   o Student files
	   o School control panel
	   o Teacher salary claims
	• Occupational Health System
	• Qualifying Board Systems
	• School Infrastructure System
	• Educational Portal

Objectives:	To support and strengthen the management abilities of Mendoza's educational system supervisors.
Mobile device:	Smartphone
Websites or documents consulted:	Presentation on 'New Management Tools for Schools Supervisors', Information Technology Area, Mendoza General Directorate of Schools
Additional observations or comments:	A telephone interview was conducted with Raúl Militello, the project's coordinator, on 1 November 2011.

Name:	**Mobile-L Programme**
Country:	Brazil
Agent responsible:	Instituto Grupo de Estudos em Mídias e Tecnologias na Educação (Media and Technology in Education Study Group Institute, GEMTE)
Partner(s):	n.a.
Dates:	2011
Target population:	Eighteen teachers and three hundred primary-school students at the Veríssimo José Maria de Andrade School, State of Paraíba, Brazil.
Problem addressed:	ICT integration, lack of pedagogical ICT tools for everyday use in school.
Description:	Pilot project using mobile phones and tablet devices for educational purposes in the Veríssimo José Maria de Andrade School, State of Paraíba, Brazil.
Objectives:	Information not available.
Mobile device:	Smartphones and tablet devices
Websites or documents consulted:	• http://www.mobilel.com.br/ • http://portalgemte.com.br/
Additional observations or comments:	None

Name:	**PSU Móvil**
Country:	Chile
Agent responsible:	Educarchile
Partner(s):	Ministry of Education of Chile and Fundación Chile (Chile Foundation)
Dates:	Began in 2008; ongoing
Target population:	Students who have finished secondary school and are preparing for the Prueba de Selección Universitaria (PSU), the national university admissions test.
Problem addressed:	Low achievement on the PSU, lack of access to test preparation content.
Description:	PSU Móvil is a free application for mobile phones through which students can download exercise packs for all sections of the PSU and have practice results sent to their email account. The application includes: • Curriculum: packs of exercises, games and podcasts sorted by thematic area • Career information: information about the full range of career options and majors available to college entrants • Glossary: some useful terms for understanding the PSU process • Important dates: PSU dates and deadlines students should be aware of • Calendar: official PSU dates (registration deadlines, test dates, reporting dates) • My track record: personalized section where students can review the results of the various practice exercises they have taken through the application
Objectives:	To provide a free application for students who are preparing for the PSU to access content and exercises associated with the test and get the results of the exercises performed.
Mobile device:	Standard mobile phones
Websites or documents consulted:	• http://www.educarchile.cl/Portal.Base/Web/verContenido.aspx?ID=203315 • http://www.educarchile.cl/Portal.Base/Web/VerContenido.aspx?ID=185376
Additional observations or comments:	None

Name:	**Puentes Educativos (Educational Bridges)**
Country:	Chile
Agent responsible:	Nokia Corporation and the Asociación Chilena Pro Naciones Unidas (Chilean Association for the United Nations, ACHNU)
Partner(s):	Nokia Chile, Pearson and the Pearson Foundation, Fundación Telefónica (Telefónica Foundation), Asociación Chilena de Municipalidades (Association of Chilean Municipalities, ACHM) and Nokia Siemens Networks
Dates	2008–2009: Design 2010–2012: First-stage implementation
Target population:	Students in Grades 5 and 6 and their teachers in vulnerable municipal schools. The project aims to reach 200 schools, 600 teachers and around 20,000 students by 2012.
Problem addressed:	Low educational achievement in vulnerable schools. Gaps in the access to digital devices and content by public-school teachers and students in comparison to those in private schools.
Description:	This programme is a local development of the international BridgeIT initiative developed by Nokia, the Pearson Foundation, the United Nations Development Programme (UNDP) and the International Youth Foundation (IYF). The programme operates by training 5th and 6th grade math, science and English teachers from participating schools in special workshops designed to help them use the digital content available on the Nokia Education Delivery (NED) platform and prepare a comprehensive curriculum for the year based on the NED content. After the workshop, the programme provides teachers at each school with a Nokia C7 mobile phone with unlimited access to the internet and the NED application, and a copy of the curriculum plan developed in the workshop. The teachers work with the curriculum in the classroom and can use the contents of the NED platform in their classes by connecting the mobile phone to a projector or television. Most of the resources are short educational videos, but the application also supports text and audio files.
Objectives:	To improve the quality of math, science and English education for students attending underserved municipal schools, through the use of digital educational resources in the classroom.
Mobile device:	Smartphones (Nokia C7)
Websites or documents consulted:	• http://www.puenteseducativos.cl/ • Plaza, G. and Carreras, F. 2010. *Documento Base Nokia Education Delivery: Puentes Educativos Chile 2010–2012*.
Additional observations or comments:	A phone interview was conducted with the programme coordinator, Gonzalo Plaza, on 16 November 2011.

Name:	**Raíces de Aprendizaje Móvil (Roots of Mobile Learning)**
Country:	Colombia
Agent responsible:	Ministry of Education of Colombia
Partner(s):	Nokia Colombia, Movistar, Fundación Telefónica (Telefónica Foundation) and the Pearson Foundation
Dates:	Began in 2011; pilot project will be implemented for three years
Target population:	Students in Grades 4 and 5 and their teachers. The project aims to reach seventy-five low-income institutions in areas with high social vulnerability and low access to new technologies. The programme is currently being implemented in 20 educational centres, 10 rural sites in the department of Caquetá, and 10 urban sites in the city of Tunja, reaching 31 teachers and 1,000 students.
Problem addressed:	Low educational achievement in vulnerable schools and gaps in access to digital devices and content.
Description:	This programme is a local implementation of the BridgeIT international initiative developed by Nokia, the Pearson Foundation, the United Nations Development Programme (UNDP) and the International Youth Foundation (IYF). Teachers at each of the selected educational institutions receive a Nokia C7 with the Nokia Education Delivery (NED) educational application. The teachers from these institutions are trained in the use of digital content, as well as the management of this technology so that it can be applied in the educational process. Through a data plan provided by the company Movistar Colombia, teachers can download videos and high-quality digital resources previously developed by entities such as the Pearson Foundation, the Ministry of Education (through its portal Colombia Learns) and Fundación Telefónica (Educared). These downloaded videos can be screened through a projector or television in class as part of teachers' lessons.
Objectives:	To raise the quality of teaching through the use of digital content and pedagogical training.
Mobile device:	Smartphone (Nokia C7)
Websites or documents consulted:	• http://www.rcysostenibilidad.telefonica.com/blogs/colombia/2011/09/20/proyecto-raices-de-aprendizaje-movil-llega-a-colombia/ • http://portaleducativocolombiaaprende.wordpress.com/2011/09/25/lanzado-el-proyecto-raices-de-aprendizaje-movil/ • http://www.afecolombia.org/es/noticiasyeventos/241-lanzamiento-raices-del-aprendizaje-movil • http://www.mineducacion.gov.co/cvn/1665/w3-article-283536.html
Additional observations or comments:	None

Name:	Seeds of Empowerment
Countries:	Argentina, Bolivia, Brazil, Costa Rica, El Salvador, Mexico, Dominican Republic, Uruguay
Agent responsible:	Stanford University (United States)
Partner(s):	Local partners in each country
Dates:	Began in 2006; first implemented in Latin America in 2009; ongoing
Target population:	Primary-school students in severely underserved communities.
Problem addressed:	Lack of access to basic education for children living in extremely marginalized communities.
Description:	This is an action-based research project with a focus on mobile education innovations designed to increase basic educational access for children in extremely underserved communities where there is little or no presence of formal schooling facilities or literate adults. In Latin America several pilot projects were developed starting in 2009, first using a device specially designed for the project (called TeacherMate). In 2010 new projects were launched using an open platform called SMILE (Stanford Mobile Inquiry-based Learning Environment). Some of the programme's main characteristics are: • Mobile platform that makes it easy to share new content • Literacy exercises and math and science simulations that encourage critical thinking, creativity and experiential learning • Low cost • Less sensitive to infrastructure and training needs than other solutions • Student-centred • Sustainable model that focuses on empowering local organizations to take control of the project
Objectives:	To increase basic educational access for children in extremely underserved communities.
Mobile device:	Smartphone
Websites or documents consulted:	• http://seedsofempowerment.org/ • Presentation 'Innovación Digital y Empoderamiento para Todos'. http://www.webinar.org.ar/conferencias/innovacion-digital-empoderamiento-para-todos • http://www.lanacion.com.ar/1416314-los-smartphones-van-al-colegio • http://lapalabra.utec.edu.sv/index.php?option=com_content&view=article&id=179:tecnologias-%C2%AD%E2%80%90moviles-%C2%AD%E2%80%90para-%C2%AD%E2%80%90la-%C2%AD%E2%80%90educacion&catid=39:campus&Itemid=59
Additional observations or comments:	A telephone interview was conducted with the Regional Director for Latin America, Claudia Muñoz-Reyes, on 20 September 2011.

POSTSECONDARY LEVEL

Name:	**Aprendizaje Móvil (Mobile Learning) Project at ITESM**
Country:	Mexico
Agent responsible:	Instituto Tecnológico y de Estudios Superiores de Monterrey (Monterrey Technological and Higher Studies Institute, ITESM)
Partner(s):	n.a.
Dates	Began in 2007; ongoing
Target population:	ITESM students
Problem addressed:	Low institutional ranking
Description:	The project started in the summer of 2007 with a pilot implementation of mobile applications that used podcasts as a delivery channel and sent text messages with announcements and course content to students' mobile phones. In September 2007, the institution opened a Master's programme that used mobile learning through its Virtual University, and since 2008 mobile learning has been used in large-scale face-to-face classes (reaching 3,000 undergraduate freshmen) on two of the institution's campuses.
	Students in these classes received a BlackBerry Pearl mobile phone free of charge in their first semester at the university. The phones have 3G technology and audio and video applications. With the mobile devices, students had access to the institution's mobile learning portal, which includes educational resources such as videos, audio files and exams. Students also have email services, text messaging, and internet access through the phones, to interact with teachers and peers.
Objectives:	To extend the benefits of face-to-face education and help students build technological skills relevant to modern society.
Mobile device:	BlackBerry Pearl
Websites or documents consulted:	• http://www.ccm.itesm.mx/tecmovil/ • Ramos, A.I., Herrera, J.A. and Ramírez, M.S. 2010. Desarrollo de habilidades cognitivas con aprendizaje móvil: un estudio de casos. *Comunicar*, Vol. XVII, No. 34, pp. 201-209. Grupo Comunicar, Spain. http://redalyc.uaemex.mx/pdf/158/15812481023.pdf
Additional observations or comments:	None

Name:	**Aprendizaje Móvil (Mobile Learning) Project at UNID**
Country:	Mexico
Agent responsible:	Universidad Interamericana para el Desarrollo (Interamerican University for Development, UNID)
Partner(s):	n.a.
Dates:	Began in 2010; ongoing
Target population:	UNID students
Problem addressed:	Low institutional ranking
Description:	The programme seeks to facilitate the acquisition of mobile devices for first-year students on forty-five university campuses and provide educational content to meet their academic needs. These devices enable students to access a range of content and services offered by the university, including: • Knowledge Transfer Centre (CTC) on each campus • @ Red.UNID (digital educational resources) • Virtual learning environment (Moodle) • Live @ Edu • Social networks (Facebook and Twitter) • Academic management system (Banner) • UNID channel on iTunes University (iTunes U) • Teaching resources in different formats and media available for various courses
Objectives:	To encourage students to access to academic information anytime, anywhere through the use of internet and mobile devices, with the ultimate aim of extending this connectivity to all of the university's educational offerings.
Mobile device:	Smartphone (iPhone) or tablet device (iPad)
Websites or documents consulted:	• http://www.oem.com.mx/laprensa/notas/n1674557.htm • Barrera Arriaga, M. and Quijada Monroy, V. 2011. *Iniciativa de Aprendizaje Móvil en la UNID*. Paper presented at the XII Encuentro Virtual Educa México 2011. http://www.virtualeduca.info/ponencias2011/283/MLearning_UNID.docx
Additional observations or comments:	None

Name:	**BlueGénesis**
Country:	Colombia
Agent responsible:	Móvil Soluciones (Mobile Solutions)
Partner(s):	n.a.
Dates:	Began in 2006; ongoing
Target population:	University and secondary-school students and teachers.
Problem addressed:	Lack of student access to mobile learning systems. Mobile learning systems are aimed at smartphones and access to networks via data plans but in Colombia only a minority of students have smartphones and/or data plans.
Description:	BlueGénesis is an academic platform that uses mobile phones to support the teaching and learning processes through Bluetooth connectivity. It involves no communication costs for students or institutions. The platform offers the following services: • Attendance records • Online evaluation • Observations in the classroom • Programming and event-logging • Consultation notes • Assignment of tasks and group activities • Programming tutorials and technical support • Voting • Surveys • Teacher evaluation, administration and other academic services • Academic calendar • Juror qualifications • Class projects • Evaluation of conferences/exhibitions • Distribution of class lectures in audio format • Capacity to send large amounts of information • Test preparation for the national standardized test for students graduating high school
Objectives:	To provide an academic platform that allows students to take advantage of mobile phones without requiring high-end devices (smartphones) or incurring communication costs for students or the institution.
Mobile device:	Standard mobile phone (Bluetooth connectivity required)
Websites or documents consulted:	• http://www.eltiempo.com/archivo/documento/CMS-4668810 • http://www.slideshare.net/EducaredColombia/el-uso-de-los-telfonos-celulares-con-fines-acadmicos
Additional observations or comments:	None

Name:	**CampusMovil.net**
Countries:	Chile and Spain
Agent responsible:	Funky Mobile Ideas SRL
Partner(s):	Participating Ibero-American universities
Dates	2008–2010
Target population:	Ibero-American university students, teachers and administrators.
Problem addresses:	Lack of ubiquitous internet access in Spanish and Latin American universities; specifically, lack of access from personal devices on campus and in classrooms.

Description:	Unofficial virtual campus via mobile devices for the Ibero-American universities community. The services and content offered include:
	• University information
	   o Breaking news and bulletins
	   o Teacher absences and class cancellations
	   o Exam information
	   o Calendar of on- and off-campus events
	   o Notes
	   o Frequently Asked Questions (FAQ) section for students
	   o Audio, text and video updates on academic activities
	   o Services for beginning students
	   o Security alerts
	   o Information about exchange programmes
	• University social network: students can view, share and upload documents, photos, audio files, videos, podcasts and video-casts

Objectives:	To offer a virtual environment for students and teachers at Ibero-American universities which allows continuous interaction with the university community during non-class time (time spent on public transport, between classes, in libraries and in public spaces off campus), for practical, social and academic purposes.
Mobile device:	Not specified
Websites or documents consulted:	• http://www.slideshare.net/eLearnCenter/campus-movil-6142004 • http://digitalistas.blogspot.com/2010/12/cronica-del-cierre-de-campusmovilnet.html • Kuklinsky, H. 2009. CampusMovil.net. La primera red social universitaria vía dispositivos móviles de Iberoamérica. Un estudio de caso. *RIED*, Vol. 12, No. 1, pp. 21-32.
Additional observations or comments:	The project ended on 31 December 2010 because of a shortage of funds.

Name:	**Postítulo de Especialización Superior en Educación a Distancia (Higher Postgraduate Specialization in Distance Education)**
Country:	Argentina
Agent responsible:	Universidad del Salvador (University of the Saviour, USAL) in Rosario
Partner(s):	Fundación para los Estudios Internacionales (International Studies Foundation, FUNPEI)
Dates:	Began in 2010; ongoing
Target population:	Students in the Distance Education programme at the university's Rosario campus (aimed at teachers and graduates of tertiary institutions in general).
Problem addressed:	Limited access to educational content in the programme.
Description:	Educational courses are delivered and completed through BlackBerry smartphones, with two face-to-face meetings required per module. A BlackBerry device with 300 minutes of calls per month and an unlimited web browsing data plan is included in tuition, with no extra costs to the student. Course content can also be accessed through personal computers.
Objectives:	Not specified
Mobile device:	BlackBerry 8520 or similar device
Websites or documents consulted:	• http://www.funpei.com.ar/secciones/postitulos/esp_educacion.html • http://www.lacapital.com.ar/ed_educacion/2011/3/edicion_100/contenidos/noticia_5043.html
Additional observations or comments:	None

LIFELONG LEARNING

Name:	Kantoo
Countries:	Mexico, Peru and Brazil
Agent responsible:	La Mark Vision Ltd
Partner(s):	Movistar in Mexico and Peru, Vivo in Brazil
Dates:	—
Target population:	Adults and young people interested in learning English.
Problem addressed:	Lack of English language skills in youth and adult populations in Latin America.
Description:	Self-directed English courses via mobile phones. The programme offers different content and services (structured courses, daily messages, practice, vocabulary services, etc.) compatible with a variety of mobile platforms.
Objectives:	n.a. (This is a for-profit company.)
Mobile device:	Both smartphones and standard mobile phones
Websites or documents consulted:	• http://www.kantoo.com/ • http://www.telefonica.com.pe/rc/noticia_detalle.aspx?id=28
Additional observations or comments:	None

Name:	**Programa Nacional de Alfabetización (National Literacy Programme)**
Country:	Colombia
Agent responsible:	Ministry of Education of Colombia
Partner(s):	Organization of Ibero-American States (OEI)
Dates:	Schedule to begin in 2012
Target population:	Youth and adults over 15 years old in vulnerable populations who have never participated in formal education. The programme is estimated to start with a population of 250,000 people.
Problem addressed:	Illiteracy among youth and adults in vulnerable populations in Colombia.
Description:	To government plans to deliver 250,000 mobile phones to illiterate youth and adults for literacy classes to be taken through the phone. The course consists of six modules of interactive content on that will be loaded onto the phone through SIM cards. Students will be able to manage their own learning and go through the course at their own pace.
Objectives:	To reduce the country's illiteracy rate.
Mobile device:	Not specified
Websites or documents consulted:	• http://www.eltiempo.com/vida-de-hoy/educacion/ARTICULO-WEB-NEW_NOTA_INTERIOR-10320345.html • http://www.cronicadelquindio.com/noticia-completa-titulo-la_alfabetizacion_sera_por_medio_de_celulares-seccion-educacion-nota-35857.htm
Additional observations or comments:	This is an adaptation of the A Crecer model, another adult education programme in Colombia.

Name:	**Soloingles.com**
Countries:	Argentina, Mexico, Paraguay and Uruguay
Institution responsible for the project:	Soloingles.com
Partner(s):	n.a.
Dates:	—
Target population:	Professionals, executives and business people who need to learn English.
Problem addressed:	Lack of English language skills relevant to business in adults in Latin America.
Description:	Language training service for professionals, executives and business people through video-conferencing and mobile phones.
Objectives:	n.a. (This is a for-profit company.)
Mobile device:	Not specified
Websites or documents consulted:	http://www.soloingles.com
Additional observations or comments:	None

Today there are over 5.9 billion mobile phone subscriptions worldwide, and for every one person who accesses the internet from a computer two do so from a mobile device. Given the ubiquity and rapidly expanding functionality of mobile technologies, UNESCO would like to better understand their potential to improve and facilitate learning, particularly in communities where educational opportunities are scarce.

This paper examines illustrative mobile learning initiatives and their implications for policy in Latin America. It reveals important lessons for policy-makers and other stakeholders seeking to better leverage mobile devices for education. Four additional papers review mobile learning efforts in other regions of the world: Africa and the Middle East, Asia, Europe, and North America. A 'Global Themes' paper synthesizes findings running across the five regional papers.

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