

Energy and ICT for educational inclusion in Latin America

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Although Latin America has experienced a successful decade of reduction in poverty and inequality, it continues to be the most unequal region in the world¹. The persistence of high levels of social injustice is not accidental: its profound structural causes are rooted in unfair political, economic and social institutional frameworks, which have been shaped throughout history by asymmetric power relations².

Among social institutions, educational systems play a critical role in reproducing social inequalities in the modern world. Latin America is no exception. Privatisation, deregulation and the expansion of for-profit fee-charging schools have increasingly eroded and weakened the region's public systems, stratifying access and jeopardising the right to education for all. As a result, and despite improvements, educational systems are still failing society, constituting a persistent source of social exclusion.

If these inequalities are not tackled, the impact of existing educational inequalities over social asymmetries will intensify as human civilisation worldwide moves towards knowledge-based societies. As knowledge increasingly defines power in the modern world, inequality in access to knowledge and information will increasingly consolidate and magnify power asymmetries within and between countries.

Latin America faces several urgent challenges^{3,4}. Firstly, access restrictions are still relevant, especially at pre-school, secondary and tertiary levels, and in geographically remote areas. Secondly, the region experiences severe inequality problems. Not only do countries exhibit low levels of learning outcomes, they are unequally distributed among the population. Public funding is insufficient, and teacher quality is low and inadequate, not only in relation to the capacity to deliver the official national

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curriculum, but also in terms of the ability to teach and transfer basic technological skills, which are fundamental to modern labour markets. Additionally, educational infrastructure is still precarious across the region; this is especially acute in rural areas, where a large proportion of students lack access to electricity, internet and computers at their schools and homes. These rural communities are usually among the most vulnerable segments of society and are those most likely to be forgotten and left behind.

Children and youth in remote rural locations are literally disconnected from the world, excluded from the opportunities provided by global learning communities. The numbers are unambiguous: around 34 million people in Latin America have no access to modern electricity services⁵. Nevertheless, the severity of the problem varies across the region⁶. In 2010, countries including Uruguay and Costa Rica had electricity coverage rates beyond 99 per cent, while others such as Bolivia, Nicaragua and Haiti exhibited rates of 77, 65 and 28 per

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cent, respectively. Moreover, electricity access varies within countries. In Bolivia, for example, 90 per cent of the urban population has access to electricity services, while only 53 per cent has access in rural areas.

Permanent access to electric power in homes and schools opens a range of economic and social development alternatives for isolated communities

This phenomenon strongly affects educational systems. In fact, Duarte, Gargiulo and Moreno³, using a representative sample of schools from 16 Latin American countries, estimate that around 11 per cent of primary schools in the region have no access to electricity. This percentage rises to 34, 46 and 57 per cent in the case of Panama, Peru and Nicaragua. Moreover, when these figures are analysed taking into consideration the geographical location of schools, the panorama is even more alarming. For example, in these three countries, 46, 75 and 68 per cent of public rural schools, respectively, do not have access to electricity to develop their normal educational activities. Finally, schools' access to electricity varies enormously depending on the socio-economic background of the students attending each school. While almost all schools serving students from the highest income quintile have access to electricity, approximately only half of those serving the lowest income quintile are connected to the grid. This unequal geographic and socio-economic pattern of electrification strongly affects the educational opportunities of Latin American children and their chance of achieving a better future.

Can access to energy and ICT make a difference?

Permanent access to electric power in homes and schools opens a range of economic and social development alternatives for geographically isolated communities. Amongst other options, it allows access to information and communication technology (ICT), which may be successfully used to enhance educational opportunities. Access by itself, however, does not automatically translate into an adequate use and incorporation of ICT into pedagogical practices, and it does not necessarily guarantee a positive impact on learning⁷. Nevertheless, when ICT is adequately adapted, used and effectively incorporated into the learning process by trained teachers and motivated students, it can strongly and positively enhance education in several ways.

The introduction of new innovative technologies facilitates and improves the manner in which learning occurs within the classroom. According to UNESCO, "technology is not neutral; the penetration of ICT in schools can eventually transform pedagogy and the creation



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barriers. Virtual learning platforms allow students to access educational content, as well as tackle homework and other assignments from their homes^{4,9}. This is especially important for dispersed and isolated communities facing conditions that often limit their capacity to attend school regularly.

Information and communication technology provides teachers with a vast amount of valuable online material to prepare lessons, improving their quality and reducing the time they have to devote to organising and preparing each module. Similarly, the availability of electricity and ICT helps to motivate teachers, and provides them with better and continuous training opportunities: they can access online training courses and share best pedagogic practices, all of which may have a great impact on their teaching skills^{8,10}. Moreover, a higher level of virtual connectivity opens a way for further cooperation within and between educational communities. Through this channel, ICT enables the creation of effective educational networks between geographically isolated schools, allowing them to jointly access, develop and share learning materials pertinent to those specific communities.

More specifically – and most importantly – there is robust evidence of the positive impact of computers on learning when these are specifically adapted and used to teach mathematics, science and literacy¹¹. Experimental studies that make it possible to establish causality among variables also confirm these findings¹².

In sum, as worldwide experiences show, electricity enables the use of new technologies for educational purposes, constructing a virtual bridge between isolated rural communities and global educational networks.

Real life stories: aiming for the stars

The penetration of ICT in education and its use in vulnerable and isolated communities is already a reality: lives are being changed in poor, rural and remote areas.

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Puentes Educativos, one of several innovative projects, has been implemented along these lines since 2010 in more than 400 schools in Chile. Aiming to improve educational quality by introducing the effective use of the new technologies, it provides students with smart phones and free internet access, and teachers with training and specially designed online material, including hundreds of videos adjusted to the local curriculum that they can download and use in their classes.

Besides increasing motivation among students, Puentes Educativos has had a significant effect on learning outcomes. In fact, a recent impact evaluation of the project shows that students from sixth grade increase their test scores in science and English by 10 per cent or more. But the project is not only about test performance: it also allows students to access and share information, and to experience new and far-away realities that they could never encounter in their own localities. No doubt this was the experience of students from San Clemente in the centre-south region of Chile, when their teacher managed to organise a video conference with a scientist working at ALMA, the largest astronomical project in the world, located at an altitude of 5,000 metres in northern Chile. Thanks to the Puentes Educativos project, those children were able to interact with scientists, relate their curriculum to real-life facts and, most importantly, were able to learn – from thousands of kilometres away – how it feels to aim for the stars.

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