Chapter 18
Cloud Computing for Rural and Isolated Schools

María José Rodríguez Malmierca
CESGA, Spain

ABSTRACT

A pilot experience of cloud computing use in a small rural school network in Spain by Galicia Supercomputing Center, financed by HP Labs in 2010, gave way to a promising exploration of the use of this technology to benefit European isolated and rural schools learning and networking possibilities. This case study will describe its origin, organizations involved, settings, methodologies and technological components used, impact on students, teachers and families, as well as challenges faced and proposed solutions.

ORGANIZATION BACKGROUND

Galicia Supercomputing of Galicia Centre (CESGA) is the centre of computing, high performance communications systems, and advanced services of the Scientific Community in Galicia (Autonomous region in the North West of Spain), the University academic system, and the Spanish National Scientific Research Council (CSIC).

CESGA Foundation is a public non-profit technological centre whose trustees pertain to the Regional Government of Galicia (Xunta de Galicia) and to CSIC. It currently has 35 employees. It was born in 1993 from the commitment of the Regional Government of Galicia on one hand to promote and support to research and, on the other hand, fulfill the interests of the National Scientific Research Council to promote work in the areas of high performance computing, communications, and advanced services in the Information and Knowledge Society.

These advanced services provide research communities, companies and society the support needed to carry out innovative initiatives related to computer sciences and applied to areas such as: education and training (e-learning), geographical information systems, and innovation transfer.

The area of e-learning of CESGA works on research and innovation projects related to the new technologies and the different processes of education and learning, as well as promoting its use in education.
and in the field of research, educational institutions, and society. This area was created in 1996, and since then, it has taken part in more than 30 research and innovation projects, partnering educational institutions and companies at national and international levels, acting in 17 of them as coordinators.

**SETTING THE STAGE**

From 1987, the Spanish educational system counts on a special kind of rural schools, named CRA (Centro Rural Agrupado - “Grouped Rural School”) where a number (3-7) of nearby small rural schools are grouped into a single school unit. This way, rural schools with just a few students (as few as 6 per school) can have a complete educational offer, as teaching staff assigned to this schools will travel to each one of them several times a day. This way, there are two types of teachers the “tutors” and the “specialists”. The former is primarily assigned to one school and attend the whole daily schedule there, and the latter are “travelling specialists” in a subject, such as: foreign languages, music, physical education, speech and language. Their daily schedule involves travelling to all the schools in the CRA for their lessons. Teaching staff meet once every week to organize activities, deal with administrative tasks, and discuss school issues. As one of the teachers said once “local roads are the corridors of a CRA”.

A Grouped Rural School covers different educational levels, from elementary school education to primary or even compulsory secondary school education in some regions (from 3 to 14 year olds). One of the common characteristics they all share is a multilevel classroom, where students from different ages and school levels learn in a shared space. This element, together to a reduced number of students, provides an inclusive and motivating learning space where younger students learn from their older peers at their own individual pace, and the eldest, reinforce their knowledge while teaching their younger peers. This is one of the most enriching features of this school model (Boix & Roser, 2011).

However, this model also has some drawbacks. The fact that teaching staff only meet once a week limits the possibility of communication among them, and collaborative work is harder to achieve when a great part of the staff is traveling every day from class to class (village to village).

Galicia is a region in the NW of Spain where this initiative started in 2010. It is one of the poorest regions of the country, traditionally associated with emigration to other regions of Spain and South America. It has a long coastline, a hilly landscape and the highest number of small rural villages in the country.

Back in 2010, Galician rural schools counted on the following infrastructure: a few computers per school (2-4), some of them quite outdated, with different operative systems (all flavors of Windows, some with Linux OS); an interactive whiteboard (Smartboard, most of them); and a DSL connection to Internet. However, due to the low quality of rural telephone infrastructure in the region, it ranged from 0, 2 Mb to 3 Mb DSL depending on the school. All this infrastructure is provided by the educational administration in Galicia, (Consellería de Educación de la Xunta de Galicia), which also provides technical support, but, as some of these schools are far from the main cities, it can take some days to fix technical problems.

Teachers are the ones that usually solve minor technical problems, although it is difficult for them, as they don’t have any specific technical training for that, and there are no other teachers that can substitute them to support class activities while they are engaged in this type of task. On the other hand, back in 2010, teaching materials used by specialist teachers were carried about in USB sticks, and plugged in the