

**UNIGIS in Latin America 1999-2009:  
Experiences of a Distance Education Program for GIS in Latin America**

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This paper will not refer to all criteria regarding strength, weakness, opportunities and threats found important for common distance education implementations at a postgraduate certificate and degree level. The UNIGIS experience is already well documented by my colleagues Car (2007), Molendijk and Scholten (2005), Painho (2002) and Strobl (2008). Nor will I refer to the shaping of the specific content structure for GIS education within a Latin American cultural context. The programs structure and curriculum can be read at [www.unigis.edu.ec](http://www.unigis.edu.ec). Rather it is my intension to reflect upon some selected characteristics in resuming shortly important steps of building UNIGIS in Latin America, and its connection to UNIGIS worldwide and particularly to UNIGIS Salzburg, and why I think that it is an important contribution to future learning models regarding GIS and the management of geospatial information with geotechnologies in Latin America.

*The role of Cartography within UNIGIS en America Latina:*

Communication by means of cartographic techniques has become more than ever a main stream task for the many professionals and citizens, articulating in a spatially referenced way their observations, findings and research results, proposals, messages, offers, needs and demands using a variety of frameworks, which offer spatial context on the internet. Sophisticated approaches taking advantage of the full power of cartography are still only accessible for the few, while the many started to “geotag” their features of interest massively on location based services throughout the world. As new information technologies enable the many to dynamically participate on mapping tasks at all scales, creating vast amounts of spatially related information, the art of producing structured, homogenous, scale dependant, meaningful, truthful, correct, consistent and effectively informative representations is still a capability of the few.

In order to use the full capacity of cartography as a spatial language to explain to ourselves better a highly dynamic social and natural environment, and learn more efficiently from each others’ do abouts and interactions with a scarce good as space on earth, a better understanding of cartography, characteristics of spatial data, and time-space contextual modeling is not only important, but rather immediately needed by our globalized information “ruled” society. Thus one of the big challenges is not only to provide better cartographic tools for web based interactive mapping tasks, but to provide the user community with a good knowledge of how to read, and more so contribute their important information in a meaningful structured way on the map. Speaking the same language would be certainly one achievement, but using a sufficiently sophisticated language to approximate the communication of our complex spatial reality in a simple way most definitely would indeed contribute to a better informed society, empowering citizens to articulate their needs, entrepreneurs their initiatives, products and services, enabling governments to share effectively common information.

That is where education for a broad and highly diverse user group of cartographic information comes in. UNIGIS<sup>1</sup> sees one of their main targets in transmitting a basic know how of GIS, and also cartographic techniques to a rapidly growing community of professionals that come from disciplines

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<sup>1</sup> Worldwide operating network of universities offering regionally specific postgraduate distance learning programs with a common core curriculum since 1991. See [www.unigis.net](http://www.unigis.net).

and fields of application traditionally quite unrelated to spatial concepts and their means of cartographic representation. Up to 60% of the students enter the UNIGIS certificate and MSc. program worldwide with little or no working experience of cartographic methodologies. Applied Research Initiatives of UNIGIS in Latin America, coordinated by the GEOcentro of USFQ, like GEOciudadano<sup>2</sup> and AmazonGISnet<sup>3</sup>, intend to translate these professional and academic environments of “distributed learning” to distinct user groups of spatial information as common citizens, and indigenous communities and their organizations, where we point towards the collaborative learning paradigm, the technology of orchestrating online services, and the key role of communication in facilitating a successful learning experience (Strobl 2008).

The structure of applications may differ for both target groups, but the cartographic representation is what makes them speak the same language and enables an informed dialog between the experts and the “common” user applying spatial information for his daily tasks in conserving, managing and designing space and spatial interactions. A systematic approach to cover these growing demands of “mapping” our knowledge and make them shareable directly without costly intermediate steps in a worldwide recognized reference system more than ever has to focus now on how to use the GSD infrastructure, and get the many to contribute to build their local systems of spatial data, making information through cartographic displays readily available for dynamic interaction between citizens.

*Experiences of a systematic approach in building a postgraduate educational infrastructure in Latin America:*

UNIGIS follows this systematic approach by offering structured didactical material and professional assistance within a distance learning environment, taking advantage of web based communication technologies, e-learning platforms and server driven networking of resource pools for both students and staff, as we dynamically build worldwide on a common core curriculum. As demands grow both in number and contents, the learning environment grows through daily structured interactions where we aim to respond to the individuals necessities of building knowledge and boosting their learning curve by encouraging to apply the conceptual contents directly within their working or research settings (Car 2007). At the same time, our critical experiences with distance learning concepts seem timely to connect not only to the need of lifelong learning systems for the professional, but also directly to a more and more visual learning and interacting environment transmitted through distributed information services through the internet.

On one side this advantage has been clear to us from the beginning especially when UNIGIS started 1999 at the USFQ<sup>4</sup> to build a Latin-American wide distance learning environment for postgraduate certificate (UNIGIS Professional) and degree (UNIGIS MSc) programs in GIS, by efficiently providing access to study materials, professional software and well structured datasets for practicing immediately within a didactically sound sequence of modules containing the body of knowledge for both careers in a still unique integrated combined curricular model both via CDs and a central online resource platform. On the other side, we had to learn a lot of lessons how to compensate and more so to directly address a critical drawback of distance education, regarding the lack of spontaneous

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<sup>2</sup> Technological platform since 2006 in development and coordinated by the author to provide a framework for structured interactive working with spatially related content for participatory, citizen driven local and regional planning initiatives. See [www.geociudadano.net](http://www.geociudadano.net)

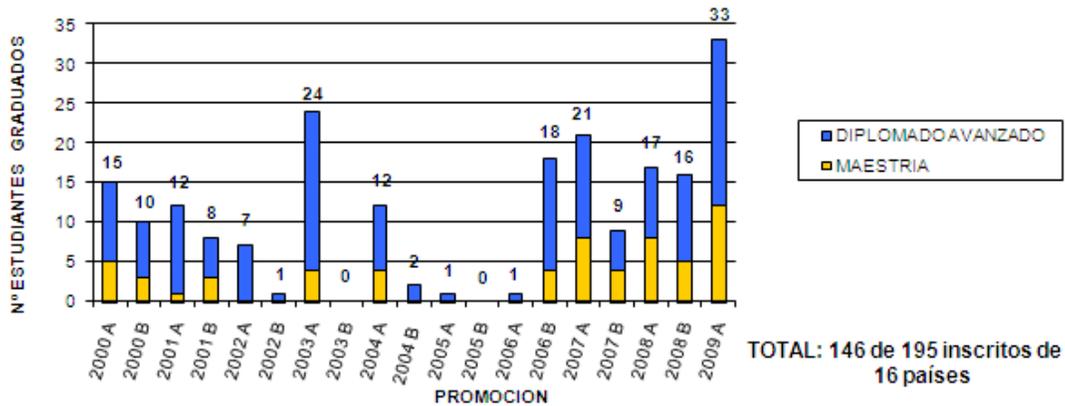
<sup>3</sup> Regional Planning and Communication network Initiative of 10 amazonian nationalities in Ecuador, coordinated by the author since 2001. See [www.amazongisnet.net](http://www.amazongisnet.net)

<sup>4</sup> University San Francisco de Quito. See [www.usfq.edu.ec](http://www.usfq.edu.ec)

interaction both in presence and group setting supported ideally by a classroom setting. We noticed very fast that certain academic issues are presented and discussed orally in a much livelier way, adding important contextual information. While for many goals within the specific terms of our rather technical program this is not essentially critical, it is very much so on behalf of the student's motivation and her/his feeling part of a group.

Especially in a cultural environment like Latin America, where communication is by far more driven by verbal interaction, we noticed that certain distance learning concepts could not be translated 1:1 from by this time well implemented European and North-American programs. It was already a difficult task to adapt the mostly Anglo-American and German written body of knowledge into Spanish without inventing too many new acronyms for foreign technologies and concepts. Finding readily available datasets for different examples in a Latin-American context was almost impossible 10 years ago. It became certainly obvious during the first two of in the meantime 20 program cycles that the students asked, after a 3 day introductory workshop held at the beginning of the program and having passed 3 month and the first 2 modules, for more presence learning experiences in workgroup settings. We adapted the curriculum to include a second advanced 2 day workshop right at the midterm of the program, shortened than the introductory session to a one day seminary, as sufficiently for orientation purposes, which equaled at the same time the possibilities from the beginning for those who could not attend due to travel expenses to the USFQ en Quito, and thus had more time to gather financial resources and support, and of course also more in depth questions and subject related contributions along the first 5 to 6 month. Still, we were not quite satisfied with this approach through the years, as more and more students from distant locations from Mexico and the Caribbean to Chile and Argentina signed up for the program and stayed rather isolated though receiving the course and defending their results on a written basis successfully. Just until recently this year, as the student numbers reached a critical number, making investments possible, and at a good time to team up with emerging competences regionally in the field, we could establish a first network of UNIGIS study centers at academic and research institutions all over Latin-America to reach these students more conveniently and on a continuous basis, creating a service point for them at a local competence center in the application of geotechnologies. So far, the geographical departments of Universidad Nacional Autonoma de Costa Rica, University of Toluca, University of Havana, and the agricultural research department of CIAT, joined the initiative to support UNIGIS students locally for the regions of Mexico and North America, Caribbean and Venezuela, Central America, Colombia and traditionally Ecuador-Peru from the central unit at the USFQ. Interests from intentional partners in Bolivia, Chile, Argentina and Southern Brazil are being considered and hopefully included by next year assuring a reachable and competent access point from time to time for individual appointments, seminaries and workshops for study-groups.

### ESTUDIANTES UNIGIS EN AMERICA LATINA



The well attended annual UNIGIS summer school offer in Europe and Asia could then also be implemented through the local study centers in Latin America. And finally we expect that each study center can learn from our worldwide experiences and contacts and build regionally a new network of partners from research, industry, private and public GI related programs, technologies, users and resources, readily available for the students and then constantly updated mostly through the graduated students working environments.

Lifelong learning means also keeping in touch after graduation, and represents a demand that has been successfully addressed by our international “UNIGIS offline” newsletters, extended seminary programs and workshops in order to keep up to date, and periodic conferences from our network of institutions where UNIGIS students are especially welcome to present their forthcoming, and stay in contact with technology, applications and most important their colleagues.

Complementing this essential adaption of the UNIGIS distance learning core concept to build a proper Latin American Program with increasing local resources in academic staff, study materials, literature, events and partnerships within a regional network, USFQ and the University of Salzburg last year signed a dual degree MSc program optional for students registered at the UNIGIS in Latin America’s center at the USFQ. What is different to most other UNIGIS programs offered worldwide is that students can sign up at the master level of the program after having completed successfully the one-year certificate program UNIGIS professional, and having passed some admission criteria, for a thesis work in English language with the University of Salzburg directly through USFQ, and obtain additionally to the Latin American official title, registered by CONESUP, a European official postgraduate academic title “MSc in Geoinformatics”. Costs are as for the whole Latin American Program kept down to indistinctively serve a broader community of applicants.

Regarding UNIGIS distance learning environments using e-learning methodologies and respective technologies, from web assisted virtual classroom real time settings, structured and moderated chats to blogs and sharepoints, and the students’ response to steadily changing architecture and interfaces of technological platforms, UNIGIS tends to grow with the flow, having established a solid resource sharing basis, and now learning from highly interactive platforms, possible through our partnerships with the leading software industry. UNIGIS in Latin America offers the student both a professional state of the art commercial environment, but also allows for a direct support of vastly emerging open source community projects and applications. Experiences of teaching and the students’ academic learning response to our specific distance learning environment, which represents a composition of interactive on line learning and downloadable enriched text documents, data and software instruments from our resource centers, can be summarized by our findings over the years that a ‘demand driven’, learner-centered and process-oriented approach is superior to

simply translating the content, didactics and organization of classroom-based learning onto online platforms. Continuing education for professionals works particularly well by distance learning if a dedicated infrastructure for developing, managing, facilitating and organizing such a learning environment is established (Strobl 2008).

*Potentials and Challenges for Education of GIS in Latin America:*

Learning to manage geospatial information applying rapidly changing environments of technologies requires definitely a collaborative approach. We learn from each other as spatial data and services including their metadata and detailed descriptions of methodologies and functionalities are leveraged increasingly on the web. As the spatial domain of information goes main stream, and new user groups emerge out of different disciplines and interests, a common learning experience is difficult to establish. Students ask for a very flexible syllabus, meeting just their needs both in content and modality, and a general GIS education becomes less attractive. While software training applying the latest technologies available might reach a certain interest group during their work or studies, a growing need of understanding concepts falls behind. Common concepts never become really obsolete, but nevertheless they might not reflect the demands to effectively apply learned methodologies to new applications. GIS in Education stands in a constant conflict between technology and content driven approaches. It is not easy to satisfy all students' needs at the right time.

We find it very necessary to bring students of different age groups, disciplines and skills, social and cultural backgrounds, and locations together on a shared learning environment. Reaching a common general understanding of GIS and basic methodologies and technologies involved is our first goal, and might be for some a lot of work, for others a good challenge of reviewing their prior knowledge and making it available in a group experience as well.

As the program evolves, we want every student to elaborate more and more his own content of interest within GIS and to build a rather specialized curriculum, without missing a core set of essentials useful to all professionals willing to graduate from our programs. The main challenge though is to really stay up to date with the more specialized modules, and make the constantly updated contents available to the student at the right time of her/his learning process. Those we offer as optional modules. The demand is growing as GIS applications can become quite specific and require more attention than the usual case study example and assignment as part of a rather generic context. To accomplish than also the qualification requirements demanded from the market, we had not only to adjust our curriculum to the highest quality standards of postgraduate education, increasing unfortunately the work load for students, but at the same time make the invested time worthwhile for each student in offering specializations so far in 6 different rather representative fields of application. Each of them require the student to select a specific combination of a minimum of 72 out of 120 ECTS to achieve a degree with a mention in "GIS in public health", "GIS in natural risk management", "GIS in territorial and community development", "GIS in communal services", "GIS in precision agriculture" and "GIS in open source applications".

All of this would not be possible without our resource sharing and network approach among academic, research and industrial partner institutions. The biggest challenge now is to create our own network in Latin America built constantly out of the students' very specific own needs

considering the particular cultural contexts of all regions strengthening both the local and regional identity and not falling behind on a rapidly growing global one.

We hope that initiatives as UNIGIS in Latin America and also their regional participation in research experiences from GeoCiudadano and AmazonGISnet, can continue to contribute to a framework of common understanding and solution finding of the many and diverse spatially relevant problems and challenges faced by governments, enterprises and citizens. This or similar networks of educational programs can definitely support the development of a common language making the best use of cartographic techniques enabling a shared and collective knowledge base and its communication for cooperation and collaboration on all scales and between all relevant actors and stakeholders.

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